

AVIATION

The Oldest American Aeronautical Magazine



TWIN WASP ENGINES POWER THE NEW VULTEES

Here are the new and powerful Vultees...largest and fastest single-engine attack airplanes yet produced for the United States Army. Like many of the other new high-performance aircraft that will maintain U. S. leadership in the air, these fast and formidable Vultees are powered with dependable Pratt & Whitney engines.

PRATT & WHITNEY AIRCRAFT

One of the four divisions of

UNITED AIRCRAFT CORPORATION • EAST HARTFORD, CONNECTICUT





SNOW NEVER UPSETS SCHEDULES *with* SNOGO ON THE JOB!

TODAY, the handling of modern air transport has come out of the hazy past stage. Air transport and all that goes with it is the last word in advancement. Instruments have at tremendous cost been developed to tell pilot and ground crew practically all they could want to know. The radio compass and radio beam keep the ship on its course to the airport. Inspection is needed out to the last word. Airports have reached a high state of development. Safety is the watchword.

And all this is to no avail when snow hits.

Snow ruins schedules. It endangers lives—you can't get 'em up or bring 'em down in a snow laden field. Road clearing sometimes takes days. Push planes back up bunks that endanger wing tips and trap dis-

ting snow. Snows are ineffective in heavy snow! There is only one positive method for airport snow clearance—SNOGO.

SNOGO removes the snow right down to the surface of the airport and throws it clear of the runways, regardless of the depth. No banks are left to endanger wing tips or imp snow loss over deepening, ever snowing lanes. Control is by one man, from a heated cab and the snow can be directed wherever desired through a reversible discharge.

Here is the answer to your snow clearance problem—here is the answer to schedule maintenance—with SNOGO on the job "grounded because of snow" is a reason for loss of business only in the most extreme conditions.

KLAUER MANUFACTURING COMPANY

Dubuque, Iowa

United Airports
protect Rentschler Field
E. Hartford, Conn.
with SNOGO

SNOGO keeps Rentschler Field of the United Airports at East Hartford, Conn., open. The diagonal runways in the picture (left below) are 150 ft. wide and 3300 ft. long. The North-South and East-West runways are 130 ft. wide and 2500 ft. long. The total surface is least of the hangars is 50 ft. wide and 2700 ft. long. The depth of the snow is six inches and the entire area of runways was cleared with a SNOGO by one man in 8 hours.

SNOGO Model LMU for Model D-50 Three Ton International Trucks

The Model LMU is a high speed maintenance machine designed for airport service. For American trucks there is the Model 20 for mounting on your standard four wheel drive truck. Snow is positively guaranteed to handle any snow conditions that will occur on your field. SNOGO 2 is either directed up to 100 ft. from the runway.



12 YEARS out of the BLUE PRINTS



SNOGO

FOR COMPLETE SNOW REMOVAL

When you purchase a snow removal and you want a proved machine. The first SNOGO went into service 13 years ago and was proved beyond doubt as principle. Each year steady improvement has developed SNOGO to a point where today it represents the highest type of snow removal equipment.



Transportation's FINEST ...The Boeing Clipper

With the introduction of the 74-passenger Boeing Model 314 Flying Boat, Pan American Airways once again sets a new standard in air travel facilities.

Largest and most luxurious air liners ever built for regular passenger service, these new Clippers are a fitting addition to the fleet of an air line renowned for its world leadership in transoceanic operations.

The BOEING AIRCRAFT COMPANY is proud to have contributed to this latest advance of the Pan American Airways System.

*Featured as follows: Dining Saloon at
Beverly Hills • A. J. Rosenberg
Companions • Writing Desk Car
one in the World • Suite • Passenger
Sleeping Accommodations*



Boeing has always built tomorrow's airplanes today!

AVIATION
February, 1937

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When Runways were greased rails

... New Departure developed the first triple-duty ball bearing

• When the Wright brothers were making their first powered flights, New Departure was busy pioneering new and better ball bearings. Today, not only in the important parts of the great airplanes themselves, but in the finest of the precision machine tools used in building them, New Departure ball bearings are specified as original equipment.

There is no guesswork. Their quality, accuracy and absolute dependability are performance proved. When it comes to overhaul and replacement, there is nothing better than the original equipment—none more dependable than New Departure.

201

New Departure Forged Steel ball bearings are made in the most modern and most equipped bearing plant in the world. Over forty years' experience is behind every New Departure that goes into the air.



NEW DEPARTURE Ball Bearings

New Departure • Division General Motors Corporation • British, Canadian
NOTHING ROLLS LIKE A BALL

AVIATION
February, 1937

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BUYING GUIDE

FOR WESTINGHOUSE ELECTRICAL EQUIPMENT

for the Aviation Industry

The list below, although not complete, indicates the thoroughness with which Westinghouse covers the electrical needs of the aviation industry. For every branch—from re-

search and engineering to airport, airway, and factory equipment, Westinghouse provides a wider range of electrical products than any other manufacturer.

AIRCRAFT AND AIRCRAFT EQUIPMENT



Westinghouse aircraft cables are used throughout the U.S. and have been specified equipment on all types of aircraft for 15 years.

INSTRUMENTS: Voltmeters, Ammeters, Voltmeters, Escapels
DYNAMOTORS: for radio power
FUEL VALVES: electrically operated
GENERATORS AND CONTROLS: radio engine driven, auxiliary engine driven
MICARTA PRODUCTS: Pulleys, Friction Drums, Bearings, Instruments and Test Stand Models, Cable Lenses, etc.
MOTORS AND CONTROLS: high speed, light weight
LANDS: for radio and landing lights
PANELBOARDS: Nafuse type
RADIO: Receivers and Transmitters
SENTINEL BREAKERS: for control of power circuits

AIRCRAFT AND AIRWAY EQUIPMENT

Lighting
ALTIMETERS: for rising light mountain
BEACONS: rotating, auxiliary and directional
CEILING PROJECTORS
CODE FLASHERS: Mercury tube or Silver conduct

FLOODLIGHTS: all types, for landing fields, hangars, landing areas, building exteriors, parking areas, etc.
MOLYBDAENUM GRANITE COLUMNS: for supporting floodlights
LAMPS: for hangars and floodlights
TRANSFORMERS AND REPAIRS: for substitution and replacement
MARKER CONES: Top over and stand and type
MARKER LIGHTS: for hangars, operations, towers, etc.
MARKER WINDS
NEW OBSTRUCTION LIGHTS
DOWN COME LIGHTS
RELAYING DEVICES: for obstacle lights
SEARCHLIGHTS: Spotting
SOUND VAPOR LAMPS
TRAFFIC SIGNALS: portable and stationary
WIND INDICATORS: cone and tail.

Control, Power and Distribution

CABLE: nonconductive, lead or steel, shielded, etc.
CIRCUIT BREAKERS: all types and ratings
CONTACTORS: for controlled lighting control
CONSTANT CURRENT REGULATORS: for station, variable or pilot type
MOTOR GENERATORS AND INVERTERS
MOORING MAINT EQUIPMENT: Motor Electric Locomotives and other electric machinery
PANELBOARDS: Nafuse type for control and protection of all circuits
PHOTOGRAPHIC LIGHTING CONTROL: relays for lighting equipment
RADIO BEACON SEARCH AND TRANSMITTER EQUIPMENT
R-C-O-E REMOTE CONTROL: SWITCHES, RELAYS.

TIME DEVICES: chronometers, time testing equipment, all or no at day demand hour
TRANSFORMERS: all types, for lighting and power

Identification and Service Ratings

AIR CONDITIONING, REFRIGERATING AND COOLING EQUIPMENT
JAMS: Casing, Borehole, Drill, Borehole
MICARTA: Decorative material for signs, tables, partitions, wall paneling, etc.
WATER COOLERS
WATER HEATERS



Westinghouse electric motor and generator in shop of the United States Navy, Newport Navy Yard, Rhode Island.

Shop and Repair

ARC WELDERS: portable or stationary, single or multiple operator, transformer and motor generator
BATTERY CHARGERS: motor generator
BATTERY TESTING INSTRUMENTS: HEAT TREATING FURNACES: all types for hardening, tempering, annealing, etc.
HEATING POTTS: babbit, solder, etc.
RESTORERS: all types—for fatigue, door, lock, pinion and fire pumps, etc.
MOTOR CONTROLLERS: manual or automatic
PANELBOARDS: Nafuse type
SUBSTATION AND POWER EQUIPMENT

AIRCRAFT FACTORY AND REPAIR STATION EQUIPMENT



A motor generator factory—completely lighted by Westinghouse—and equipped with a large amount of Westinghouse electrical equipment, such as transformers, switchboards, motors and controls.

ARC WELDERS: portable or stationary, single or multiple operator, transformer or motor generator type
BABBIT AND SOLDER
BATTERY CHARGERS: motor generator and transformer
BATTERY TESTING INSTRUMENTS: CAPACITORS: for power factor correction
CIRCUIT BREAKERS: Dr. line, carbon, oil type
DIESEL ELECTRIC LOCOMOTIVE EQUIPMENT
FLUID VALVES: electrically operated for handling liquid and compressed air medium
FUSES AND FUSE BLOCKS
GEARS AND PINIONS: heat-treated or blued

GRAB UNITS AND SPEED REDUCERS

HEAT TREATING FURNACES: for hardening, tempering, annealing, etc.
HEATERS, ELECTRIC: for homes, commercial buildings

INDUSTRIAL ANALYZERS: INSTRUMENTS AND METERS: all types for a-c or d-c

INSULATING MATERIALS: varnishes, tapes, compounds, resins, etc.
INSULATION TESTING EQUIPMENT:

LAMPS
LIGHTING EQUIPMENT: Luminaires and accessories

MILITARY POST: babbitt, solder, etc.
MICARTA PRODUCTS: pins, pins, sheets, tables, elements, angles, etc.

MOTORS: for shop tools, fire pumps, etc.
MOTOR CONTROLLERS: manual or automatic

OX, PURIFIER: centrifugal and other types
PANELBOARDS: Nafuse type

RESISTANCE WELDING: Spotting
Time, Weld a tool

SAFETY SWITCHES
SOLDER: and soldering compounds

SUBSTATION AND POWER EQUIPMENT:

WATER COOLERS
WATER HEATERS

RESEARCH, SCHOOL AND LABORATORY EQUIPMENT



Radio world of Washington, D.C., West Coast at University of Washington, Department of Engineering.

DYNAMOMETERS
ULTRASONICS AND GENERATORS
ELECTRONIC DEVICES

HEAT TREATING FURNACES: all types for hardening, tempering, annealing, etc.

INSTRUMENTS, ELECTRICAL: PKE CIRCUIT

POWER ANALYZERS: PORTABLE: for diagnosis of circuit faults, unexplained problems, etc.

OSCILLOGRAPH
RELAYS

STRIDGLOW: for study of rapidly moving or vibrating machinery, pre-processor

TACHOMETERS
TOWING CARBIDE MOTORS AND CONTROL
WIND-TUNNEL MOTORS AND CONTROL

WESTINGHOUSE SERVICE PARALLELS THE AIRWAYS



With sales offices in every principal city, with a chain of 37 well equipped service shops, and with 27 warehouses and stockpiles with stock and apparatus and electrical parts, Westinghouse provides facilities within quick and easy reach of every customer within the aviation industry. Whenever your electrical problem may be, expert engineering assistance, complete information and prompt service is always available. Consult your local office, or write Westinghouse Electric in Manufacturing Company, East Pittsburgh, Pa. Address Dept. T.N. 1940.

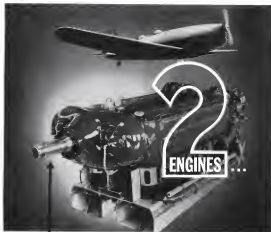


Westinghouse

AVIATION
February, 1933

Aviation Equipment

AVIATION
February, 1933



...WITH BUT A SINGLE "PROP"

Two ENGINES spin the single "prop" in this new Vega plane. For info, uninterrupted power, two Menasco motor drive through single reversing clutches. With this Curtiss power plant, no synchronizing is needed. Operating singly, either engine provides ample power for climbing.

To withstand grinding loads and shock stresses, Lockheed and Menasco engineers agreed that this new free wheeling propeller drive must be fabricated from SAE 351 steel—the strong and tough 5% Nickel alloy steel.

For high fatigue resistance and high core strength with a hard wear resistant surface, this Nickel alloy steel is engineered to develop a Rockwell (C) hardness of 60-62. Years of experience have proved that Nickel alloyed into metals induces such owner, such lack of material tensile carry more load.



LOWER CORROSION LOSSES

Proven tests for plane materials, without steel Government authorities indicate that corrosion losses are reduced, upkeep expense lightened, by specifying stress-treated wings and fuselages from specially processed nickel alloys. This light alloy but extremely strong corrosion resistant material usually carries about 15% less weight and 8-10% Nickel. Complete information furnished upon request for.

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PUBLICATIONS
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ALL LOCKHEED AIRPLANES ARE Anodized!

Another maintenance economy by Lockheed!

ANOTHER treatment adds more to the extensive maintenance of airplanes—this and aluminum airplane paint. Anodization of aluminum alloys is a standard requirement of the U. S. Army and Navy. For airplanes in this group, Lockheed has anodized its aircraft on Lockheed's own anodizing facilities in every phase of Lockheed's production.

This is part of a group of technical services on display by Lockheed to increase the efficiency and efficiency of airline transportation and reduce operating and maintenance costs.

Each program is developed on lock design and production is based on constant research and

the problem of low temperatures. It is evaluated in every phase of Lockheed's own active and performance; then the commercial anodizing of aircraft parts to the standard various and per spreading dollar.

Lockheed studies your suggestions of an anodizing process of all aircraft components in the process of 20 years (throughout the world). Each part is applicable to the particular use of the Lockheed model with the Lockheed open system.

• *Lockheed is an active technical consultant of the surface of a metal which produces a high quality finish to corrosion.*

LOCKHEED AIRCRAFT CORPORATION
BURBANK, CALIFORNIA
REPRESENTATIVES THROUGHOUT THE WORLD



Flashes

From the Skyways of the World

IN We once could read through the 24th annual report of the National Advisory Committee for Aeronautics without seeing a publishable grade in its achievement. At the same time anyone who is at all versed in aircraft progress should know that now is certainly no time to rest on our research laurels, for the same for our country will not be more in the time but is now being brought out in the research laboratories. Other nations of the world are crowding us closely for our hard-won technical superiority. In considering phase for an extended air defense program, we hope that the needs of the NACA laboratories will be kept on the top of the list in full recognition of their irreplaceable place in the pattern of our national defense.

IN AIR DESIGNER for the NACA, congratulations to Luther Gifford's Institute of the Aeronautical Sciences for the election of Dr. George W. Lewis as its president for 1950. Dr. Lewis' contribution to the advancement of sciences through the National Advisory Committee for Aeronautics is too well known to need repetition for readers of AVIATION. It is certainly fitting and proper that the Director of Research of our greatest aeronautical laboratory should head up the activities of our Institute of the Aeronautical Sciences.

IN AIRCRAFT INDUSTRY READER: To the 25th Club of American aeronautical engineers, Earl Fiedler

and his U. S. Air Service. At last, now that there are two of us in this category, work is being carried on. But although America's standard U. S. Air Service by some three years, certainly none of us in this staff standard Earl Fiedler in very editorial capacity. Earl Fiedler is the dean of American aeronautical editors.

In This Issue

Lots of things that have to do with problems of various kind of pilots flying what AVIATION's Annual Directory of Engines and Engines for civil and military use. A number of specifications for aircraft engines are included in a special section, although a more detailed special treatment of all military types are presented in the Air Defense Index of November, 1950. This time we take all with an account of changes including methods in Europe that are looking to the introduction of piston engines and piston engines near them. Next . . . a discussion of our proposed testing program, together with some studies on our own development in civil aeronautics. . . A typical "highlight of month" story showing how a number of types, whose specifications appear later in the directory, are doing and jobs in civil aviation. And then it goes back to the Navy. . . . Berlin Times of 1950, a series of special reports showing how developments are meeting the requirements of the private market in the air and the private business and in the air. . . . And, more news AVIATION's Annual Directory and Specifications. Tables for all air craft in production, the air craft, for military types available for export and for all as more in civilian use (civil or military). . . Finally, a summary of all kinds for airplanes and engines, and for contractors. In private business and in the air of a detailed index complete with manufacturers, names and addresses.

and the fact that he has brought his constant exposure through 20 years of his life personally single-handed in a manner of the entire of the war. He has certainly devoted his life to the development of aeronautics. Long may he live!

IN 1918, DURING THE FIRST LAST month saw also two noteworthy moments for the first. At 12:45 p.m. on Monday, January 8, with his flag ceremony, the name of Juan de la Cerna was carried beside the names of other soldiers in ceremonies on the battle of the Englewood School of Aeronautics at New York University. The Hon. Harry P. Guggenheim, Professor Alexander Kluge, Dean Theodore S. S. and Major A. H. Foster, spoke briefly of de la Cerna's contribution to the theory and practice of flight in military wings. The ceremony marked the 30th anniversary of his first flight in an airplane. And from the other side of the world came news of a soldier and finally strong command. The crisis at Auckland, New Zealand, here denied a single day for the promotion of safety in the air and for private efficiency of aircraft to the memory of Captain Edward Mousley and his six companions in the Somerset (Daguer) lost in the South Pacific on January 12, 1920 on the first transoceanic flight from America to New Zealand. This tragedy is to be awarded annually in any group or body within the United States or the British Empire which is the option



AIRPLANE PRODUCTS:

BRAKE WHEELS

High and Low Pressure "Streamline" Smooth Castings

TAIL WHEELS

AXLES

Low Pressure "Streamline" For All Wheels

BRAKES

Mechanically and Hydraulically Operated

OPERATING CYLINDERS FOR HYDRAULIC BRAKES

TAIL WHEEL KNUCKLES

For "Streamline" Wheels, Steerable and Non-steerable with Shimmy Dampener

PNEUMATIC SHOCK STRUTS

Designed and Tested to Meet Individual Requirements

PILOT SEATS

Standard Army and Navy Type

Engineering Information is Available to these Interested

BENDIX PRODUCTS DIVISION

OF BENDIX AVIATION CORPORATION • SOUTH BEND, INDIANA

BENDIX

AIRPLANE WHEELS • BRAKES • PILOT SEATS • PNEUMATIC SHOCK STRUTS

Side Slips

BY
ROBERT OSBORN

FOR SO MANY YEARS we have been using paratroopers—the advertising of course, paratroopers, gliders, airplanes and automobiles—of airplane pilots, in full dress uniforms, of leather crash helmets and goggles, standing all steadily and manfully at a point about forty degrees above the horizon. We decided to find out if there were pilots like those anywhere. Accordingly, we assigned our corps of specially-trained investigators to search the highways and byways of the aviation world for this phenomenon. They have just reported back, after years of research, that they did find two pilots in similar dress and attitude. One pilot was cruising out a mile outside who had taken off right under her where he was coming in so loud, and the other was a baby flying in tractor landing for rate so that he



would get and make some money in the Operations Office pilot game.

"Q. I would like to know whether a person in an airplane, traveling 300 miles per hour, would be able to crash out and pull in a cushion ball which is traveling beside the airplane at the speed of 300 miles per hour. T. B. K. A. The National Bureau of Standards says that a person in an airplane

traveling 300 miles per hour would be able to crash out and pull in a cushion ball which is traveling beside the airplane at the speed of 300 miles per hour. The force which the person would have to exert would be equal to the force which he would have to exert on the same cushion ball resting on a 1000 lb. table to draw it toward him."—From the *Aviation*, to Question Column in the New Orleans *Times-Picayune*.

Stems as if somebody is working up a new act for the National Air Circus Program.

"This letter says, in fact, the air paratrooper plan of the administration, outside slip-hoof right wing comes for a large group of pilots, at a number of colleges. It colleges students meet in this course the way they do to most of their other studies, we can expect something like the following:

Professor: Mr. Jones, I'll have to work, via helicopter in the future it was considered making delegates, big parachute jumps just to get out of class about a time.

Student: These delayed openings were's, sometimes? Professor: I'm not making out so well in the Parachute-Parking course.

Prof: Mr. Corcoran, you're still making that comment, really? I'm not. However, you seem to get good results, and I can't say that your home-work on your own plane was excellent.

Mr. Corcoran: However, Professor, I think that comment must have been said. I suggest my surprise when—Prof: I know. Mr. Corcoran, we're

here over all this before. Mr. Fuller, I'll have to send you in to talk things over with the Dean if you do any more of this flying through the hangars.

Mr. Fuller: I'm sorry about this Professor, but you see I was going through a temporary course, and—Prof: This is a rather extended session, you're getting, Mr. Fuller.

Two months ago that was the reason you should everybody off the ball course and three weeks ago you had so far down the length of Main Street passing up all traffic. I suggest you get a new story or a different line, really.

Now Mr. Brown, we'll see if you really were asleep in my lecture. Please show the class how to make a landing is a cross-work—

—Oh, Oh! I'll have to make you



new on that. Please add the rock room can to where we another place.

Mr. Brown: I think I should get a paratrooper on that question. Only half of the landing gear and a wing were involved.

Prof: Alright, I'll give you five. You did well away from it. Can't be denied, I think that Mr. Brown, on my lecture on landings, so he won't be down and the gas given out.

"AVIATION'S SEASON OF GROWTH OF the whole aviation, Mr. Grover Watson, announced that there will be a 150 ft. Parachute Jump out of the New York World's Fair. The Tower, according to plans, will have eleven parachutes with steel wires to keep them open, vertical and give way to guide them, and shock absorbers to cushion the impact of landing.

Considering the old and well-known theory that soldiers spend most of their time off in amusement park now, let's suppose the Fair officials expect this occasion to be a favorite with the public. However, we think the number of visitors to the fair will be very small. We know very few pilots who are posted to heights in anything but an airplane, and we have a clear recollection of one professional pilot of three years' standing, who nearly proved me at the top of a Fieser Model.

AVIATION

February 1933

17



Private flying is dead in Europe. Pressure of war preparation is pushing control of all flying and ground training into the hands of the State. In considering plans for war air defense expansion we must be on our guard so that "it can't happen here."



See to Britain! A hard-boiled B.E.F. Field Sergeant gives British Flying Cadets their first lesson on the ground above.
A group of young German aviators pilots and taxi machines for an ever wider aviation horizon.
Bucklers in one of Germany's aviation schools learn some of the rudiments of basic discipline.
Eighty-five girls in England are being converted to a group of Air Force mechanics in an official school.

A NEW WORKING set in a Berlin office across the desk from one of the most popular men in Germany aviation, a man who leads up what is probably the largest single aeronautical organization in the world, Kärge-Falkner Generalleutnant Chlausmann, head of the National Socialistic Flyers' Corps (NSFK). He told me that his active Corps-men in uniform, organized in some 320 Stands scattered over Germany, number over 50,000 ("and most of them are flying", put in Staudtmeister Staudtmeister, the General's wife). Besides taking care of the flight and ground training of the active group (whose ages range from 18 to 30) the NSFK supervises the training (with models and an air-plotter) of over 100,000 members of the 13 to 17 year-old Hitler Youth (Hitler Jugend) who are enrolled for aviation and the model building activities of 1,000,000 Pupils, the school boys between 10 and 12 whose greatest ambition is to be in the wings of the German Air Force.

Give a job this, der General Chlausmann, is then responsible for all the aviation training activities in the Third Reich outside of the Air Force proper. This in-

cludes even the reservists who have served their time in the Luftwaffe and have gone back into civil life.

Membership in the NSFK is voluntary, but there seems to be no lack of interest in membership. And why should there be? The NSFK offers advantages to its members. German youth that are not available elsewhere in the world, except possibly in Italy (and in Russia?) where aviation programs have been set up. Boys may begin their aviation career at 10 years of age when they are still in the grammar schools, making a study model with material furnished by NSFK, to plans developed and distributed by NSFK, and under the supervision of competent instructors trained in special NSFK schools for the job. As they progress through the H.J., they move up to higher and more complicated models, including models powered with miniature engine engines, and in time, those who are qualified graduates into the gliding and soaring camps scattered all over Germany. Here they may qualify for their own license and then move on into the power flying school where instruction is given on machines furnished by the Corps and by instructors of the Corps. All this, as

North, South, East and West, on flying fields and in factories, the youth of the world is

—“MARCHING as to WAR!”

By S. Paul Johnston
Editor of AVIATION

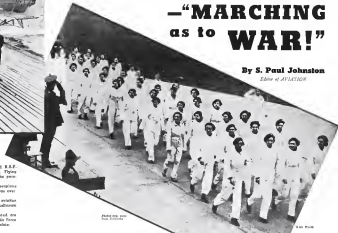


PHOTO BY GUY
FOR THE EDITOR

20,000
10,000
2,000

PORTS, PLANES, PILOTS

While the countries of Europe have found it necessary to militarize their civil aviation, we haven't been doing too badly under our system of private enterprise.

A FIRMATIME ANNOUNCEMENT by the White House of a proposed CAA plan to train some 20,000 new pilots through the medium of a \$10,000,000 aerial program in the established schools caused some understandable concern among flying schools and fixed-base operators all over the country. Especially, since based on the basis of the release came a flood of rumors of the establishment of new government-owned schools to be staffed by instructors from the Army and the Navy. People who had spent their years and their money in building up a business now ground to be cut away under their feet by direct government competition. No children seemed "Discouraged!"

The real trouble, of course, was that the thing went off half-cocked. As we read it, the college training scheme is very much on an experimental basis. The results that are obtained from the first program this Spring (financed by \$15,000 from the National Youth Administration) will determine whether or not the larger scheme is practical. And, since the plan calls for the use of the facilities of the qualified established fixed-base operators located near the colleges selected, we can't see where anyone already in the aviation industry is going to be the loser. As Grand Marshal said in his speech at Miami, "...we intend to utilize the competent civilian flight instructors now available throughout the country, and to use the well-known training places with which they are now teaching." Period. "...and it is our plan to strengthen and stimulate the private flying industry in every possible manner—to utilize existing airports in the vicinity of the schools and colleges included

in the plan. In effect, local flying instructors will simply become faculty members of the educational institutions." And so fixed-base operators that we knew would object to being called "Trainees," if it is school was full to capacity with students whose ability to pay for flying time was not based by what extra they could shake down from Papa, but was guaranteed by the Great White Father in Washington. Also, as we understood it, each flying course will probably be put on as "volunteer" basis.

As for the larger flying schools,

although no definite announcements have yet been made, it is a fair guess that they will be kept fixed in cooperation with pre-war Army pilots and mechanics. It would seem only good sense to adopt some such plan as is now in use in England under which the military services continued for the entire career of a qualified school. Men already enlisted in the air forces are sent to the civilian schools for their first 50 hours of flight, and for their ground school training. Those who survive the highly selective process in these private schools that

come into the air force proper with a sound foundation on which to build their military work. We have a dozen excellent schools available in this country which could feed into Randolph and Tuskegee a constant stream of pre-trained pilots, and provide a continuous supply of first rate mechanics.

The greatest danger as we see it, is to our private flying, as such. If we aren't careful we may find ourselves in the condition of those European countries whose private flying has disappeared entirely, absorbed completely by the State under pressure of purely military considerations. Again, in the case of our airplane mechanic problem, we are fortunate in having time enough to work out some sort of balanced program with out being forced by an emergency into something we may not want.

As the charts on these pages will show, we have done fairly well under our system of private enterprise. Two thousand airports, ten thousand civil pilots, and twenty-fold thousands of civilian pilots is not a bad showing for a poor old democratic country, is spite of all that the "dictator" boys say about their own efficiency. But we must admit that we have made progress more or less in spite of ourselves. So far, there has been very little in the way of coordinated co-operation for post-scheduled aviation coming out of Washington. The

important thing for us to do is to recognize that we already have "got something" and then to go on from there with some rational, long range planning that will make use of all

available experience at home and abroad to supply the increased need of our defense forces, without losing all individual initiative or hopelessly crippling our private flying

PILOTS

Including:

1,159 Airline pilots
6,814 Commercial
1,005 Ltd. Commercial

10,676 PRIVATE
3,005 SOLD
304 AMATEUR

675 women are included in above

Not included in total—172 glider pilots



1934

1939

22,963 NOW HOLD CAA CERTIFICATES

PLANES



1,159 more are uncertified

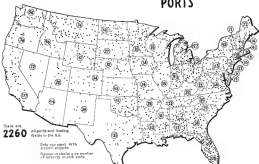
Besides, there are 221 gliders

Private planes in the hands of U.S. private pilots in 1938 flew over 100,000,000 mi. 4,000 times around the world

less than 300 of this number are on commercial airlines



PORTS



There are

2260

airports and landing fields in the U.S.

Only one airport with aircraft engine

Approx. no. shown in number of airports in each state



Spreading ground Blown now used by Pennsylvania Motor Police

Traffic Violators BEWARE!

Next time you try to talk yourself out of a traffic ticket in Pennsylvania remember the officer may have accurate information on your indiscretion broadcast from the State Police airplane. The officer will know he uses airplanes in police work and emphasizes the need for more of them.

By Rear Admiral P. W. Foote, U. S. N. ret.

Consultation: Philadelphia VNA Club

With William L. Wilson

THEY, it is said, get on, one study for something which will never happen. A state police force is said to have in Pennsylvania prepared however, for something which is almost certain to happen.

Increasingly, the sudden crash of industrial trouble will be repeated. The shock of inevitable flood waters will be felt again in the Conemaugh Valley, at Johnstown or the Golden Triangle at Pittsburgh. Again, serious gas leaks or the dangerous dash of commercial bank gangs will make whole across the epidemic of armed robbers. Traffic snafus will clog our highways at the top end of business

and holidays and the certain increase in automobile travel will add accidents to police safety. Police will be that close to persistence in their duty to remote sections, far from essential surgical and hospital aid.

For such police action as there is at the Pennsylvania State Motor Police are beginning to provide aviation as an auxiliary service, which need not be neglected. In aircraft, no before we have one more arm of our release which will increase greatly the effectiveness of our police service.

The Pennsylvania Motor Police are operating a few-plane State plane flown by one of our own men

*Aircraft
at
Work!*

in aircraft, a captain's rank. The use of this plane is largely to represent, designed to provide us with information which will equip us to increase our automated corps as it becomes desirable and possible. In this respect, to mobilize troops of the State, including Gov. George H. Earle, are taking a large and helpful interest.

The traffic problem is one of major importance. In this field, police aviation can provide some day-to-day service quite different from the more spectacular dash of criminal marauders.

Using two-way radio, traffic experts can spot where congested highways paralyze difficult stretches or large

accidents of truck teams. By contact with highway authorities, much can be done to clear up the international traffic jams which greatly impede a super-highway into the traffic equivalent of a rural lane.

Pennsylvania motor policemen and authorities in other states have consistently proved the practical quality of this work. New York, New Jersey, Pennsylvania and other states have cooperated with commercial radio stations to broadcast directly to radio police vehicles information on the best and speediest routes to key destinations, such as the Holland Tunnel to New York City or the Delaware River Bridge between Philadelphia and Camden. This data, considered in regular commercial programs, has largely been gathered by air search.

Last Labor Day, our force used a different tactic—one that is expected to prove of greatest usefulness. The Commissioner undertook to survey much of the southwestern section, near Pittsburgh and found he was able to direct motorcycle officers directly from their barracks in spots where slow-moving trucks had become unsuitable obstructions, which accidents or other temporary hazards had seriously impeded the flow of holiday travel, or where reckless drivers were at large. The precision of control, such prompt action in the situation, pulling heavy trucks from the roads, cutting travel over less congested areas or asking in the other members only, which are open to good traffic officers.

If plans were available, limited-mile highway links could be provided in their entirety at least once every

hour in air searches. The effectiveness of this service, with perhaps ten or twenty miles of road constantly under the eyes of our men, contrast sharply with the present necessity of deploying a half-dozen or more police cars or motorcycle units for the same duty, with each these men handicapped by being so only one member of a unit at one time and each restricted to his own operations in the congestion of the heavy traffic he is attempting to control.

It must be noted that police generally moderate after the underworld. Progress made by law enforcement bodies frequently follows in the wake of new vehicles introduced in law breakers, and then comes to rest only because the law is put on the defensive and must retreat or be helped.

The unfortunate accident occurs because legislators and other opinion-praising bodies are inclined to be close-minded toward police and are frequently not aware of improvements or modern equipment will forced to do so by ingenuity and progressiveness on the part of the crowd.

Police weapons have become more efficient and lethal only because the more pure fell into criminal hands. Many "airmen's" associates killed various officers before police were generally outfitted with such tools. The deadly spray of the machine gun was turned on the forces of law and order in many a costly meeting before police were allowed to purchase these weapons and get to battle properly armed.

Even today, the automotive equipment of most police forces is inferior to that which thieves can steal or buy. We can be equipped and out-maneuvered by high-powered cars that would be exorbitantly expensive to purchase in quantity for any police department.

Federal and state police, however, (This is page 384)



A give drops in where airplanes have a lot



Antelone service Motor & A. Johnson (left) and Captain A. H. Breda (right) Sergeant W. D. McAlpin (right) and all of Pennsylvania Motor Police



Interiors for

Private aircraft for 1933 are designed for better vision, and have fewer things for passengers to fall over getting in and out.



An interior shot of the Fairchild 24 for 1933.



Top: The Captain's seat slides back to provide extra room in the Cessna 441, shown.

Bottom: Push-back wheel control slides up the floor space in the Taylor T-400, shown.

Right: There's plenty of room in the cockpit in the new seat of the Cessna 441, shown.



AVIATION
February 1933

11

Comfort

You can see all around from the cockpit of the Fairchild 24.



The Cessna seat is folded for extra room in the cockpit.

An interior view—the D-17 B cockpit.



Mostly like a big transport is this interior of the D-17 B.

For Happier

LANDING GEAR are growing simpler and cheaper, easier to operate and to maintain. And with this progress belly landings are growing more infrequent. Retracting of the bicycle landing gear is being recognized and the prototype is under consideration for several future designs.



1. The Avenger Child has a good looking landing gear.
2. Simplicity and cleanliness characterize the Ryan gear.
3. The Curtiss Wright Interceptor with wheels tucked in.
4. Cuck's full hydraulic landing gear.
5. Powerfold 42 retractable gear.
6. It's easy to get into the Curtiss Air Car.
7. For better vision in the Waco H triplane gear.
8. A de installation by Air Transport Equipment Inc.
9. Full retractable on the Cessna.
10. Landing gear of the Luscombe 16.
11. North 18 retractable gear.
12. A Powerfold 42 on the Edo Plover.



Landings

Aircraft cowings have been suggested recently and even the light, inexpensive ships are coming out of the factories with workmanship and finish that would do credit to an automobile plant. It is becoming increasingly difficult to single out the less expensive ships from the higher priced models.



PROPS and POWER



How the Hamilton-Standard hydraulic propeller mechanism operates. Features of the design are specific pitch control and feathering blades.

Advanced Rotax (Franklin) installation in the Aerozone Chief. Essential parts of the power plant are readily accessible.



Left: The advanced engine installation of the Continental 18 in the Aerozone Chief leaves ample space for service.

Below: The Continental 30 installation with cowling closed makes a highly efficient and attractive installation.



PLANTS



In the Oerlikon design the cowling is tilted at the top and exposes the entire engine when opened.



An inline engine installation by Puma which effectively exposes the Hamilton power plant interior.



Wright Cyclone of the Cyclone - Wright installation.

Below: A typical installation.



The Lightning Controllable propeller is shown in a 100% pitch position.

It's easy to get at the engine in the Aerozone 10 when the cowling is opened.



Both side doors open in the center of the Curtiss-Wright 11 for better service.



AMERICAN PLANES AND ENGINES



for 1939

In the pages that follow we present photographs, line drawings and complete specifications of the aircraft now in production for private and commercial use, specifications of military aircraft available for export and photographs of typical military aircraft. At the special request of manufacturers we have separated and plainly marked these commercial ships whose approved type certificates have not yet been granted and have further segregated them by printing their specifications in italics. A key to the symbols used in the specification tables is on page 41.

In addition to the airplanes herein listed there are many others under development by established manufacturers who are not yet ready to release information on their products and by new manufacturers who are eager to gain acceptance for their designs.

The engine pages contain complete specifications for power plants in current production and photographs of typical engines in all horsepower groups. Both military and commercial engines are included.

Typical accessories and radio equipment for use aboard the airplane have been pictorialized beginning on page 83 and a complete accessory directory begins on page 88.

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10



No. 870



Tollens' Reagent



LandscapeView 80



A.T.C. 656



A.T.C. 352



Laurencia Pharoque



Microarray 531



卷之六 304



A.T.C. 647



Laurensius 202



Monoculture 130 Seeds



A.T.C. DIV



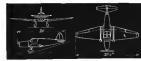
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Miller 3

Philippe C.T.3

No A.T.C.

**Phillips 1**

A.T.C. 622

Name of Broker	General				Future Plans										Performance			
	Description of Fund(s)	AUM (million)	Price of Shares (\$)	Status of Fund	Total Assets (\$)		Assets by Sector		Investment Strategy		Risk Rating		Assets by Sector		Performance			
					Domestic	Foreign	Equity	Bond	Equity	Bond	Equity	Bond	Equity	Bond	Equity	Bond		
Barclays American Corp.	Barclays American Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays International Corp.	Barclays International Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Corp.	Barclays Global Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays High Yield Corp.	Barclays High Yield Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Real Estate Corp.	Barclays Real Estate Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Technology Corp.	Barclays Technology Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Energy Corp.	Barclays Energy Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Healthcare Corp.	Barclays Healthcare Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Financial Corp.	Barclays Financial Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Infrastructure Corp.	Barclays Infrastructure Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Commodity Corp.	Barclays Commodity Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Multi-Sector Corp.	Barclays Multi-Sector Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Emerging Markets Corp.	Barclays Emerging Markets Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Dividend Growth Corp.	Barclays Dividend Growth Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Small Cap Corp.	Barclays Small Cap Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Mid Cap Corp.	Barclays Mid Cap Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Large Cap Corp.	Barclays Large Cap Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Bond Corp.	Barclays Global Bond Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Equity Corp.	Barclays Global Equity Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Bond & Equity Corp.	Barclays Global Bond & Equity Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Bond & Equity & Commodity Corp.	Barclays Global Bond & Equity & Commodity Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		
Barclays Global Bond & Equity & Commodity & Infrastructure Corp.	Barclays Global Bond & Equity & Commodity & Infrastructure Corp.	1,000	10.00	Open	100	100	100	100	100	100	100	100	100	100	100	100		

22

[illegible]

鳥居三郎博士 著 佐藤幸三 訳



A.T.C. 604



Stearns-Hammond, Y. 1987.



A.T.C. 600, 601, 700



Taylorcraft Model-B



A.T.C. 943



Taylorcrest Medical-A



No. 1234



Appendix 5

Security 518

No ATC

Watch: [OPW](#)

A.T.C. 637. 638

Key to Abbreviations Used in All Specification Tables

[illegible][illegible][illegible]

AEC 100

Source: New Standard T1.28

Season 59

A.T.C. 659, 679, 685

A.T.C. 650

Byron S. Wild

Waco H

A.T.C. 671

LTC 600

Southern Enterprises TWA

Wave C

A.T.C. 654, 665

Twelve Monoclonal-88

Drug M-JTW

Wave 3

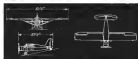
No A.T.C.

[illegible][illegible]

AIRPLANES of 6 or more SEATS



Tallapoosa Shynoblet, Pacemaker



AIC 576 503



ATC 003



Booklet Code: TSP-1



Bellmont Airlines Cargo



ATC 903



ATC 034



Research 1087



Downloaded BC-1



ATC 54E



N= ATC



Evaluating 2009



人言云，其時



Air Transport T-6



Download DC-4



No A.T.C.

[illegible]

438

[illegible]

MILITARY AIRCRAFT

[illegible][illegible]



ENGINES for 1939

In the plentiful treatment of aircraft engines for 1939, you get a preview of the new powerplants all the types could add to the dramatic and rapid market. The photographs in this page and in page 10 are representative. Turn to page 10.



The 16 hp Opposed Light Aviation Engine Group 3, Maximum 3 Cylinders 2 Cylinders 1 Cylinders 1. No Control
3. Lighter Weight—The 10V—11 1/2
4. Maximum Super Run, 10V—11 1/2
5. The Peak Fuel Consumption by 10V—11 1/2
6. Double Metal 1.6
10. 10V—11 1/2
10. 10V—11 1/2

American Aircraft Engine Specifications

AVIATION News and various responsibility for the engine group

Engine	Model	Year	Power	Weight	Length	Width	Height	Stroke	Compression	Valves	Ignition	Oil	Water	Propeller	Accessories	Notes
1	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
2	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
3	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
4	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
5	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
6	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
7	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
8	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
9	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
10	10V-11 1/2	1939	16	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5

(Turn to page 10)

[illegible]

Page 4. Winamp Worm Justice



From 4 Wilsey Street, Dorset, N. Wales



Frank A. Whaley & E. Ronald Spaworth



Exhibit A: Whimsical Tunes Where Numbers



Foot & Wilmer, Inc. 1999 ©



Page 4 Wilsey Tolia Manual



Warner Super Stores



ENGINES

for 1939

Continued from page 194

leaves of the complete line. Among the variable parameters are various large green plants of both the oil and lipid cooled types now under development, but scheduled to roll here soon.



Wingtip: Whitehead B-100 E Series



NOTES: 1. The following information is for informational purposes only and is not intended to be used for any other purpose.



Weights & Measures Series Cycled



Weight Double Row Cylinders



WALTER A. HAMILTON

Speaks out!

TRANSCONTINENTAL & WESTERN AIR, INC.



Aviation Division,
The Texas Company,
135 East 42nd Street,
New York, N. Y.

Dear Mr. Elsie:

The longer I am in maintenance work, the more I am impressed by the desirability of the lubrication that makes today's aviation engines possible.

In this work, we would immediately know of the slightest increase in depreciation or wear. As you know, the TWA Maintenance System of research, engineering, overhaul, inspection, rebuilding is for this very purpose.

Our confidence in Texaco aviation products and technical service is shown by the fact that we are in our 8th year as Texaco users.

Kind regards.

Very truly yours,

W. A. Hamilton

WALTER A. HAMILTON
Superintendent of Maintenance

PAID BY ADDRESSEE • AIR MAIL • AIR EXPRESS



Texas Station buys gas to fly in the Texas Air Service—a full line of aviation maintenance—over Midland, El Paso, Dallas, San Antonio—400 E. 57th St. Dallas, Tex. 75219

TEXACO

AVIATION
February, 1932
25

TRAINED AVIATION ENGINEERS stand ready to show you how to get the best out of Texaco Aviation Products, available at all important airports.

The Texas Company, Aviation Division, 135 East 42nd Street, New York City.



MANUAL INSPECTION of component parts of a disassembled engine. Parts are discarded if there is any evidence of wear.



ENGINEERS examining disassembled engine, ready for re-assembly in TWA's Kansas City overhaul base.



TEXACO PLANE at Kansas City, being serviced with fuel and lubricants by Texaco truck.

Aviation Products

AVIATION
February, 1932
26



Ludlow Fuel Valve

Aircraft Engine Accessories

For classified accessory directory see page 88



Wright Cyclone with Brass Cladding



Edison Edison Edison Hydraulic Pump with Torque Drive



E-40 Inlet Fuel Pump by Deere



Edison Type X M1 Motor



Edison Edison Edison Hydraulic Pump with Torque Drive



Beefe-Edison Aircraft Wapack Type ST 50-1



Combustion Motor by Edison



Aero Spark Plug
Edison Type AD and AA Dynamometers on a Power Pack



Aircraft Spark Plugs by Bendis



Champion Spark Plug



Electric Tachometer Type STB-01 by Edmonds



BG Model 100-00 Spark Plug



Pioneer Aircraft Tachometer Indicator



Protector Tank Filler



Wink Eye Clamps



Ice Warning Indicator, Model CA by Moss



Tachometer by Weston



Rosen Vacuum & De-luxer Pump Type B4



Lewis Engineering Thermographs



Spitfire Chair Chair

AIRCRAFT Instruments and Accessories

For classified accessory directory see page 58



Gun Sight
Pittsford



Mykover Model D
Radio Cassette



Sperry S.C.A. Autostabilizer Direction Finder



Pittsford Messing Size of Position Computer



Pioneer's Instrument Compass



Turn and Bank Indicator by Pioneer



Kellman Reaction Indicator



An instrument panel specially grouped for use of the A10 Spitfire system



Pioneer instrument panel with Sperry Gyroscopic Indicator



Kellman Accelerometer, Type 111



Pioneer Flip Position Indicator

Pittsford Microscope Instrument Mounting



The Howard Warner combined
instrument for light planes



From the New product with an early test type.
Chen

RADIO for SAFETY



1 "Ho-Tek," the new multi-indicator receiver manufactured by Air-Tek.

2 Instrument landing receiver, a revised Radio Radio Corp. development.

3 The Collins Radio Company 282C an experimental ground-station transmitter.

4 Folding loop director antenna designed by T. F. & T.

5 Super Heliograph, a product of the Radio Corporation Instrument Corp.

6 Western Electric's new 15-Mc. heterodyne receiver, type D1A.

7 Van Radio Receiver Service Transonic, type A, for simultaneous two-channel, 2,400-Mc. frequency for mobile receiver.

8 Air Radio's attachable antenna reel and isolator.

9 Wireless and Marine Receiver Finder Corporation's #1, with extraordinary auto meter.

10 Associated Radio Company's new antenna system.

11 Radio Frequency Laboratories' compact beam compass receiver, type CB-3.

12 A new RCA receiver for aircraft, the lightweight, light weight AVE-15.

13 Low Power Transmitter Development Radio Receiver Filter and Selective Switch.

14 Teledyne Aerial Camera Corporation's Visually Indicated Receiver Finder.

Inductor Compass

Air Trunk Manufacturing Co. introduces "Dry-Trunk" compass.

THE EARLY INDICATOR COMPASS, which characterizes the decrease of the earth's magnetic field by a rotating coil, has not been used in aviation, because the early forms of inductor compass were very sensitive to jolting or bumping movements. Now word comes from Washington that the Air-Trunk Manufacturing Company (who have developed the Air-Trunk system of instrument loading) has perfected a new version of the inductor compass with a sufficiently small return time. When the compass is being magnetized by a sudden motion of the ship, the return action to the correct bearing takes place in less than one-half second. The compass (which is illustrated on page 64) may be mounted on any part of the ship, and its indicator brought to a remote indicator on the instrument panel. Also provided in the panel are a course-setting knob, a sensitivity control, and an on-off switch. Because of its freedom from magnetic due to jolting and rolling motion, the new compass is also suitable for marine use.

2-way in 25 lb.

BCA announces a new lightweight transmitter and receiver for the instrument fiber, with a unique coil antenna.

TO MEET THE NEEDS of the instrument fiber, for the light plane where weight and cost are the basic factors, RCA Manufacturing Company has designed two new units: the AYT-13 transmitter, and the AVR-15 receiver which weighs, together, at less than 25 pounds. The transmitter (illustrated on page 65) weighs only 18½ pounds, complete with remote control panel and cable. It contains two 6LA tubes and a vacuum-tube vibrator power supply, provision for two external crystals, and for switching from one to the other. Tank circuit tuning is adjustable from the front panel and is readily locked. While the subject is an antenna loading coil with eye brought out to a switch, for optimum matching to the antenna. The power is low, but when used with the coil antenna described below, it gives 100-mile



RCA AYT-13 Transmitter

radio service. On the ground, working into a whip-rod antenna, the radius is 5 to 7 miles, more than is usually needed for on-the-ground communication.

The AVR-15 receiver is a companion to the transmitter, but lighter and so much smaller that it can be mounted anywhere within arm's reach of the pilot. The tuning range is from 200 to 400 kc. between bands. A highly useful feature is a toggle switch to the right of the tuning dial which switches the tuning from the variable to a fixed frequency of 275 kc. (traffic control frequency). By flip ping this switch, the operator can stop lightly from the beam to the control tower and back again without leaving the station. The longest dimension of the receiver is 6½ inches, and its weight, complete with cable and power is 6 pounds, 5 ounces. It is perfectly feasible to operate the receiver directly from the power supply of the AYT-13 transmitter, and this is usual practice if both units are installed. The total installed weight, less antenna, is then only 24 pounds.

The ground end of the link of receiver, transmitter and antenna, the Cordex type here brought a hand-rod antenna with several new twists. In the first place the rod itself is "free

whirling?" It can be used only to reel the wire in, not to let it out. The wire is released by turning the rod back a quarter turn against the rubber disk, thereby releasing a brake which allows the drag on the wind-sock. In the second place, as convenient in the form of a flexible rubber waisted fastener is used to convey the antenna wire from the reel to a weather-proof fixture. The wire is introduced through the top of a fixed, reinforced with a weather-proof housing. The wire is led straight backward from this housing to a fixture on the rubber post. At this point the wire is attached to a fabric wind sock. When the antenna is extended, the sock pulls the wire through the fixture and all the advantages of a trailing antenna are available. But when the antenna is reeled in, the wire is still exposed from rubber post to wing, and can be used as a fixed antenna for on-the-ground work.

Short-wave D-f

Bessis Corp. announces a direction finder suitable for high-frequency signals.

A REMARKABLE NEW TYPE of direction finder, which affords control advantage in spite of the conventional loop has been developed by Bessis Corporation, Inc. of Newark, N. J. In contrast to the loop-type receiver, which loses accuracy at high frequencies, the new Bessis compass actually improves as the frequency increases. The error due to night effect is also said to be minimized. Further details will be published as soon as available.



Direction-finding antenna with flexible helical

AVIATORS
February, 1938
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MARTIN 166

powered by WRIGHT CYCLONES

Since 1912, when the Glenn L. Martin Company pioneered the high-powered, mid-wing, twin-engine bomber of the type now identified as the Martin 166, bombers built by Martin have come into use throughout the world to vital units of aerial defense.

The first models of this type, usually rated as fast as any bomber in service at that time, demonstrated that bombing planes could outspeed the then existing fighters. Like the first, all but a small percentage have been powered by Wright Cyclone Engines.

Built to a sound and time-tested basic design, this

series of Martin Bombers has proved able to take full advantage of each new advance in aeronautical science.

For example, the Wright Cyclone-powered Martin 166 of 1935 is nearly a mile a minute faster than the first bomber of this outstanding type and, with its greatly increased striking power, is considered one of the world's most effective aerial defense weapons.

WRIGHT AERONAUTICAL CORPORATION
Patented New Jersey

A Division of Curtiss-Wright Corporation



WRIGHT Aircraft ENGINES



FACTORY: An Abundant Church in Santa Ana, California, was the first Martin factory building in 1907. Oliver C. Martin started building his first airplane here.



SCIENCE of Aerodynamics in 1917, is today as far advanced that each of the 70's technicians on the Martin Engineering Staff concentrates on a single specialized phase of research, testing or design.



MASS PRODUCTION: What a long step from the first handmade Martin to great assembly lines like this! Here, thousands manufacturing planes achieve the precision, accuracy and dependability of modern mass production.



Here's how
MARTIN
aircraft
are built



MARTIN-BUILT AIRCRAFT have been world-famous military airplanes since 1918, again in 1935. The Martin B-26 Destroyer, shown above, contains a balance of speed, range, load capacity, dependability, maneuverability and performance unheard of a few short years ago.



CONTRAST THE SIZE of the present Martin Plant at Baltimore, with the first one. San Gabriel Mission in 1907, it became the world's largest airplane assembly plant, as here it could accommodate 100,000 sq. ft. of space. It is continuously improved to meet the world's needs, most complete airplane factory.



INSPECTION: Each is stressed design must pass "Magnolia" test before inspection to detect cracks hidden in the core. Such tests pre-empt the dependability of every Martin airplane.



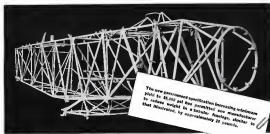
PRECISION in Martin manufacturing requires skill touch of specialized craftsmen. When you are working of an intricate mechanism that spreads the operation of a Martin airplane landing gear.



WINGS OVER THE WORLD: With a wing span of 137 feet, a flying range of 10,000 miles, a top speed of 200 m.p.h. and a payload of 10,000 lbs., this magnificent Martin bomber. Transported without the fuselage, the C-47 Clipper, in air, water, overland, and in the air. The main section of the wing which provides the great stability and resistance to develop every greater achievement in aviation.

MARTIN
Builders of Dependable Aircraft Since 1907
AIRCRAFT

THE GLenn L. MARTIN COMPANY, BALTIMORE, MARYLAND, U. S. A.



The new permanent specification increasing minimum yield to 45,000 psi has permitted our manufacturer to reduce weight in a biplane fuselage, similar to that illustrated, by approximately 25 pounds.

Is there any substitute for **STEEL TUBING** when you give proper value to . . .

PHYSICAL PROPERTIES

Weight-Strength Ratio, Fatigue Life, Impact, Compression, Tension, Torque, Bending and the combination of two or more.

AVAILABILITY

Present production volume of tubing can be increased at least 5 times (500%) in 30 to 60 days.

ADAPTABILITY

Steel tubing is today standard for many parts on all planes. It can be welded by at least three different methods. It lends itself readily to heat treatment to obtain a wide range of physical values. It can be formed, bent, shaped, etc., with moderate cost equipment.

SUMMERILL TUBING COMPANY

BRIDGEPORT, BRIDGEPORT CO., PENNSYLVANIA

STANDARD SIZE AIRCRAFT STOCKS ARE AVAILABLE FOR PROMPT DELIVERY

F. D. Puts Program Up To Congress

(Story on page 48)



MAIDEN VOYAGE: The first of the Boeing-207 Stratoliners takes off the field at Seattle on its first test flight. An AVIATION reader knows, it is the first air line plane with cabin supercharged to permit normal operations up to 20,000 ft. Three are scheduled for early delivery to Pan American Airways. Eddie Allen, just finished with his long job on the 215, is in charge of these tests also. (Picture on page 48)

ROUTINE TRANSFER: Forty-eight big Consolidated patrol bombers of Fleet Patrol Wing No. 1 just months left San Diego as made for the Caribbean war games. First ship was USS Albatross (p. 48), 2,000 miles from the point of take off. (Story on page 54)



Curtiss-Wright Shows off New C-W 21 Interceptor First-Minute Climb Reported Best On Record

SOMEWHAT HEAVY new machinery are swiftly being dropped up into the air last month along Ft. Lewis, Mo., and again over Dayton, Ohio. Curtiss-Wright had begun testing and demonstrating its new C-W 21 "Interceptor." Powered with a single Wright R-1500-45 Cyclone rated at 1,000 horsepower at take-off, the new ship is, so far as we know, the fastest climbing aircraft that has ever been flown. You don't believe it? We have it on excellent authority that it has done a first-epoch 124-thrifty climb of a five-foot better than one vertical static mile—something slightly better, that is, than 1,500 ft. per second.

The plane's outstanding climbing power are by no means its sole claim to good performance ratings. It has a maximum speed at 17,000 ft. of over 300 mph, a maximum speed at sea level of over 280 mph, a cruising speed at 15,000 ft. of over 270 mph, and a top speed in dives of 300 mph. The plane's absolute ceiling is 25,000 ft. Its service ceiling is 15,000 ft. Its cruising range at 600 m.p.h. is 500 miles, at 300 m.p.h. it is 650 miles.

The significance of such a ship as modern air strategy can hardly be over-emphasized. More in flexible power, speed, and better low altitude performance, it is a most valuable advantage when called upon at sudden warning to assume the defense against high speed attack by the C-W 21's wings. A plane such as the C-W 21 would be able to take off and climb to altitude of 25,000 ft. in less than six seconds may turn the long useful mission for the defense of prime military targets and important municipal areas. The C-W 21 is a two-engine, single plane aircraft, with wings being design objectives have been high speed, rate of climb, maneuverability and low engine. Although such requirements put great pressure on weight saving, the C-W 21 has a high-speed load factor of 30 times

that by U. S. Army Air Corps methods.

The wing, of stressed internally braced monocoque dural construction, is built in three sections, right hand upper panel, center section, left hand outer panel. The wing tips are removable. Flaps are of the open type and are automatically operated through a chain drive from the cockpit. Ailerons are dynamically and statically balanced and are provided with foot tabs for gross adjustment of wing balance.

The fuselage is of monocoque stressed dural construction, riveted to the center section of the wing through long stretch angles. The tail race is removable. Provision is made for a large power compartment aft of the pilot. Curtiss-Wright leaving the protection of the pilot to reveal a nose-cone is built into the structure. The engine mount is of welded Corbin magnesium steel mounted in any vibration shock absorber units of rubber. Complete power plant forward of fuselage is designed to be interchangeable in any main-line of base. Above the cockpit is a wind shield and sliding canopy of transparent plastic material, adjustable as high for visibility. Landing gear can be operated from inside or outside.

Power features in the monocoque in the fuselage structure directly behind the pilot is a lower unit capable of absorbing a force of 10,000 lbs. The forward half of this lower is a nose cone mid fuselage joint about nose, behind, that absorbing protection to the point against machine gun fire from the rear. An additional plate of the nose material may be attached on the lower portion of the nose behind that providing protection for the lower portion of the pilot's body area. With the radial engine structure as a shield in front of the pilot and nose, saving from the pressure from gun fire from below, the pilot is thus protected from all the most dangerous directions.



The landing gear is of the retracting cantilever type using retractable 6 ball type and 5/16x20 fluid-type hydraulic wheels. The air and oil also are kept right and are half inches of travel. The gear is retracted by hydraulic cylinders mounted in an intermediate bulkhead. Wheel fairings open automatically with the gear and flaps into the center engine when closed. The tail wheel uses a shock absorber unit and is mounted in a single side track structure through lower of the tail fin. It is a tail wheel.

The tail control group consists of a fixed one piece stabilizer. The elevator is dynamically and statically balanced and is equipped with trim tabs controllable from the cockpit. The fin is also fixed and is offset for trim at cruising. The rudder is dynamically balanced and uses two aileron-like (fin tabs).

The Cyclone engine is equipped with a two speed supercharger and a standard Gipsy carburetor model 1271-C. The first valve is a fourth valve that mounted between two layers of aluminum alloy. The propeller is a Dowling-Bowditch Constant Speed, has 20 degrees of pitch range. The fuel system consists of two 24 gal. tanks in the engine section and one tank of 14 gal. mounted in each outer wing panel. Total engine oil is 10 gal. The oil tank holds 5.5 gal. and gasoline oil ratio of 14 to 1.

Standard engine speed control is automatic of one MD-40 (130 cylinder) machine gun.

and one MD 32 (50 cylinder) Col-Kremer machine gun.

An estimated below low weight was at a high pressure throughout the process of design. The engine output as a result is only 3,000 lbs. The total load includes fuel at 770 lbs., oil at 48 lbs., structure at 120 lbs., pilot and parachute at 190 lbs., oxygen equipment at 50 lbs. The total actual gross weight is thus 4,800 lbs. and even the G-5 cyclone alone amounts for 1,200 lbs. The ship emerges as an all-around top Curtiss-Wright's standard speed.

The wing span of the plane is 30 ft. overall. It has an overall length of 25.5 ft. and an overall height of 8.75 ft. Figures on wing area are not given but it can be seen from the attached three-view drawing that the aspect ratio is higher than for the more orthodox pursuit designs.



LIGHTWEIGHT STRENGTH. The fuselage structure of the C-W 21 is of simple semi-monocoque design. Weight saving was held at a premium yet the ship retains a high load factor rating and a quarter inch steel plate has been incorporated on the sheet's end for protection against gunfire. Gross weight is hardly two tons.



HANDS ACROSS, ETC., Squadron Leader J. Adkins of the R.A.F., congratulates Lockheed engineer C. L. Johnson in the final of the 6-1/2, shipped to England last month.



LOOK OUT, RAGGERS! The C-W 21 Interceptor's rate of climb is the fastest thing in a metal pipe seen in an airplane.

First, Lockheeds for R.A.F.

Flight tests rushed, deliveries start on 200 bombers. Kerber joins staff.

LATE IN SEPTEMBER the first of 500 Lockheed monomarine-loading planes for the British Royal Air Force was given preliminary flight tests at the Lockheed Aircraft Factory, Burbank. Within seven weeks are under the supervision of Squadron Leader, Lockheed chief test pilot, and will be checked by Squadron Leader James Adkins, of the British Air Ministry. With a backlog of 500 orders now exceeding \$25,000,000, the Lockheed factory currently employs about 2,000 men in a two-shift per day, 48-hour work basis. Almost completed orders recently announced is a repeat order from British Airways for two new Lockheed 14 transporters. Expansion of Lockheed's domestic sales organization has been announced by Carl B. Squier, vice-president in charge of sales, with appointment of E. V. Kerber as direct factory representative in Washington, D. C. Kerber, formerly with the aircraft manufacturer section of the Bureau of Air Commerce, has also served with the Army Air Corps,

was at one time president of the Export Aircraft Co.

Vega Bays Factory

An announcement by Mac Short, president of Vega Aircraft Company, reveals the purchase of six and one-half acres of land, together with a factory building, adjoining the Lockheed plant in Burbank, Calif. The factory has about 17,000 sq. ft. of floor space, of which Vega is already occupying some 40,000 sq. ft. An extensive flight test program is being conducted with a Lockheed aircraft converted to act as a flying test stand for the Vega's power unit which the Vega will feature. Various Detroit, test pilot, has made repeated full load landing and take-offs with one of the two Vega engines completely shut off. Using only a single engine, the airplane took off in 200 ft., which compares with a run of 300 ft. when both engines are used. The Vega power plant uses a single constant speed propeller driven from the two engines through a set of connecting shafts which automatically disengage in event of stoppage of either engine. The Vega is to be ready for flight testing early this spring.



YOU CAN TELL FROM THE LINES—that the C-W 21 is an airplane product of step-by-step refinement, but a bold departure toward new goals.

Sperry Promotes Wildman

George C. Wildman, C. E., has watched C. E. Wildman from industrial assistant to the vice-president, to Director of Flight Research, in which capacity he will coordinate new engineering developments with the requirements of transport and aircraft systems group. Wildman was active with the Navy during the late war, is credited with more than 4,000 hours of flying, and has been credited with improved design, the Director of Research of the Department of Commerce, and the Naval Aircraft Factory. He came with Sperry two years ago after serving as Senior Pilot for Pan American.

De Post Licensed by Martin

UNDER A CONTRACT just completed between the parent-factory, The Glenn L. Martin Company of Baltimore, and R. B. de Post de Nemours & Company of Washington, Del., the latter company is placed in position to market the recently introduced "Missing Link" to the entire industry.

PROFITS AND LOSSES

W. AIR INDUSTRIES, INC., for fiscal year ending Sept. 30, 1939, net profit of \$204,400 or 10c each on 2,044,400 shares of common stock, against \$49,240 or 70c on 2,044,400 shares of common stock for previous year. Net sales amounted to \$1,144,000, an increase of \$24,150 or 2.1 per cent over the total for the preceding year.

W. AIR INDUSTRIES, INC., for the month of Oct. 31, 1939, net profit of \$20,000. For year ended Oct. 31, 1939, the corporation had a net income of \$100,000. A final dividend of 40c a share on the common stock was voted. The last dividend was the year in a per cent four-pence note Oct. 27, 1937.

W. AIR INDUSTRIES, INC., for the year ending Sept. 30, 1939, net profit of \$40,000, equal to 80c each on 50,000 shares. Company with profit of \$10,719 or 10c each on 107,119 shares for same period last year. Net income for the 12 weeks ending Nov. 12, 1939, was \$100,000 or 10c a share. Current assets as of Nov. 12, 1939, \$174,000; liabilities, \$15,730.

W. AIR INDUSTRIES, INC., for year ending Sept. 30, 1939, net loss of \$14,720, for same period ending Sept. 30, 1937, net loss of \$10,250, including \$1,250 in depreciation deductions. Net sales for year ending Sept. 30, 1939, were \$17,230, compared with \$17,230 for the same period in 1937. Current assets as of Sept. 30, 1939, \$104,430; liabilities, \$79,710.

The new cells are made of an "aluminum" which is light but impregnated with synthetic rubber, and are to be installed in one-way "twin tubes". They were developed by Martin engineers after several years of research aimed at producing an airplane capable of taking less damage from bullets than metal tubes. In addition, the cells have demonstrated the further advantage of superior resistance to corrosion, due to the fact that synthetic rubber is not affected by salt deposits or water.

Profits for Precision Products

DEVELOPMENT of Precision Products, Inc., of Los Angeles, totaled \$10,160.00 during November, 1939, according to a report by C. A. Harbin, general manager. November deliveries, an average time of working, were said to have actually exceeded November. A small profit for the first eight months operation of the company was forecast in the statement. J. B. Kenney has been elected secretary of the company and T. M. Deal has been made a director.

Robinson Buys Kinser

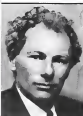
THE AMERS of Kinser Airplane & Motor Corp., Glendale, Calif., have been sold to R. B. Robinson and a syndicate of investment brokers. The Kinser Co. has been operating under bankruptcy for the same months, with Karl Kinser acting as trustee. Operations and sales have been continuing and engine development work has been in progress. The new owners of the assets are reported planning immediate expansion of Kinser engine manufacturing operations. Sales were reported at \$100,000. Approximately \$100,000 in capital is still being in the R. B. C. and a Federal Bank registered prior to incorporation proceedings.

Ryan Expands Facilities

A MAJOR 1939 expansion program has been announced by T. Claude Ryan, president of Ryan Aeronautical, Long Beach, Calif. Factory buildings will be materially enlarged and a large amount of new manufacturing equipment is to be installed. Increased space will be provided for engineering, and for executive offices. Construction work is now under way on the Ryan Administration Building to provide the modern office and engineering facilities. The additional construction increases the tower section of the building to a full five stories. Factory expansion is to include addition of two new buildings providing an increase of approximately 17,000 sq. ft. of floor space. Equipment to be installed will expand facilities of the R. B. C. and include manufacturing departments, and of the aircraft manufacturing division which builds specialized parts for other aircraft manufacturers. They were Ryan deep-bank were said to be installed to supplement the five factories now in use.



THE LABS—HAS ELECTED Dr. George Lewis the 1939 president.



—HONORED Prof. Alfred Harman of MIT, with the Best Award for his airplane work.



—HONORED Russell Harman of Bell Labs with the Sperry Award for his turbine engine invention.

AVIATION PEOPLE

Who's Who in This Month's News



NEW JOB—Edwin Allen, awarded by most best job design award as U.S. No. 1 Test Pilot Engineer, has just finished months of work on the last Boeing 304. Now, he has moved out of Seattle, he has begun putting the new Boeing 307 through a similar course of service.



NEW JOB—Harold M. Harman (left), Vultee's new Factory Superintendent, made over some work in hand with the new Vultee Plant Manager. A general engineer, Harman has served with Boeing, Ford and Martin. Now 50, he has been in touch with factory work for sixteen years.



NEW JOB—Stanley A. Hedberg, new Director of Public Relations for the Avionics Manufacturing Corp., has been an aviation publicist since 1927—after the Avionics—used in aircraft, and, through the Avionics Corp., for many Southern Bell Western Division of United.



NEW JOB—Edwin Allen, awarded by most best job design award as U.S. No. 1 Test Pilot Engineer, has just finished months of work on the last Boeing 304. Now, he has moved out of Seattle, he has begun putting the new Boeing 307 through a similar course of service.



NEW JOB—Alan P. Beadles, thirtyyears in Avionics, World War pilot, and since 1938 superintendent of technical instruction at the Boeing School, is now assistant superintendent of flying for the Western Division of United.

LOGGING THE LINES

Air Transport Drift Sights

by DAN SAYRE



Every air line President whom press agent knows can name and address has sent an ode of the same earnestness to the effect that 1959 was flat but that 1960 will be much better. None of them were so naive as to expect how much finer 1960 would be, but general confidence took among our trials. The trouble is that the lines expect the new World. There will have our line could up at least 30% over 1959 by the middle of the summer. . . . In our case, for the first time in months we have received buildings on orders of new aircraft by domestic operators. American has ordered five more Douglas "King Shaps" at a cost of \$360,000. The order order was placed last October. Deliveries are scheduled for between March and May. TWA has ordered three more Douglas "Sky Clubs" at an overall cost of approximately \$500,000. . . .

More interesting than the 16 per cent increase in passenger traffic for all the domestic operators together, are the individual reports for the various companies that have been trickling in during the past month. TWA's traffic gained approximately 8 per cent, American up 24.5 per cent, United down 10 per cent, Chicago and Southern increased a 35 per cent increase in passenger. Boeing was up 35 per cent. Pan-American Central reported a 18 per cent increase in the number of passengers carried. . . . American Airline's total of 25,250 revenue passengers for the year is, incidentally, a new World Record for any air line. . . . Another World Record was the membership in January by United of its 25,000th transcontinental flight. This is equivalent to about 60,000,000 miles of flying.

The ICC is still with us. In what should be one of its final decisions directly submitted with air transport rates, that commission on December 28th, boosted TWA's mail rate. It ruled that the company's pay should have been 50¢ per mile between October 1, 1959, and June 30, 1957, instead of 80¢ as was paid. After July 1st, 1957, the commission held, the company was entitled to a base rate of 50¢ per mile on a base mileage of 600,000 miles per month. The immediate result was to shave \$160,000 in revenue from pay off the Xmas tree into the TWA treasury. . . . Few days later a TWA spokesman revealed the line will apply to the CAA for a further rate increase in its transcontinental rates and on its three additional routes. "Because," he said, "TWA

still receives a rate of payment less than the air mail post-mile rates for the company."

Another small will serve on the part of our own Society committee. It has taken the form last month of a new Air Traffic Conference of America organized as a division of the Air Transport Association, its purpose being the handling of traffic agreements and the administration of traffic matters for the member air carriers of the association. Charles A. Heston of American is President. D. D. Walker of Chicago and Southern is first Vice President. L. W. Ireland, United is second Vice President. W. F. Hoffman, formerly of United, has been appointed full time manager.

Personally speaking, Jerry Lambert, Jr., of the St. Louis Lambert, after two years with United as traffic man in New York and Hollywood, has joined Airline Packer System, Inc., an assistant to Richard Crane, President. . . . Gail Katzkin, chief business for TWA's Eastern Division for the past eight months has been appointed chief business for the entire TWA system. . . . Ray Haddock moves into Strickland's former post. . . . Trans-Canada Air Lines has named Herbert D. Haddock as traffic representative in Toronto, Howard C. Colman as District Traffic Manager for the W-

range region. . . . United has named Allen F. Ronsale, long superintendent of technical instruction at the Boeing School, to be assistant superintendent of flying of its Western Division system on year 1961. . . . Edward Payson, Jr., formerly of American Airlines, has joined Air Associates to head up a division designed to cooperate with the air transport companies on problems of engineering, maintenance and the development of inventory equipment. . . . Their objective is to eliminate costly duplication of technical and shop effort in solving problems which are common to all operators using similar equipment. . . . Norman B. Hestey has been appointed Treasurer of United Air Lines to fill the vacancy created by the retirement of C. B. Brock. . . . Hestey, who leaves the position of Director of the CAA's Bureau of Economic Regulation, served with the ICC from 1948 to 1952.

AIR TRANSPORT INDICATOR

January 1, 1959

138.2

Which is the ratio of the revenue passenger miles reported by the Air Transport Association as carried by all domestic airlines during December, 1958, to the corresponding figure for December, 1957.

25,000,000 passed this on the first twelve months ending 1957-1958 60,000,000-476 60,000,000, up 14.6 per cent.



ALL AMERICAN: Foreground, Vice-President Ralph Deane, Fleet Officer Ted Anders, President C. R. Smith. Background one of three new Sikorski American Airlines has purchased for instrument training.

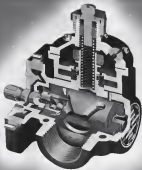
MENASCO
IN-LINE
ENGINES

1100 SOLD BEFORE A PUBLIC ANNOUNCEMENT

-that's real confidence in

PESCO

PRODUCTS



PESCO 8400 Series Fuel Pumps with Diaphragm type Valve—capacity 182 gals. per hr. at 1150 RPM.

PESCO 3400 Series, Same type—capacity 182 gals. per hr. at 1150 RPM.

Both 3400 and 8400 series are adaptable to the high pressure required for the new aircraft engines.



AIRCRAFT PRODUCTS

Fuel Pumps
Vacuum Pumps
Hydraulic Pumps
Oil/Water/Water
Compressor Pumps
Fuel Inlet Pumps
Power/Fuel/Water
Hydraulic Motors

Power
Accessory Drive Gear Boxes
Ballast Fuel Hydraulic
and Check Valves
Oil Separators
Special Features Built to
Customer's Specifications

With "an eye to the future" PESCO engineers have now perfected a fuel pump with a diaphragm type relief valve, which eliminates the fatigue failure of the metallic syringe type. Years of exhaustive research and experimentation have resulted in this new model. These pumps have met the standard Army 1000-hour endurance tests—under much more severe conditions than those encountered in actual service—with no appreciable fatigue. Hundreds of hours of flight tests corroborate laboratory results—and 1100 have been ordered even before this first public announcement!

Contributor to the U.S. Government for approved aircraft components

PUMP ENGINEERING SERVICE CORPORATION
Specialists to the Aviation Industry
1818 TAFT AVENUE • CLEVELAND, OHIO, U.S.A.

AVIATION
ENGINEERING

AS OTHERS FLY IT

A Bird's-Eye View of Aviation History

Their ability to deliver lines in Britain has finally materialized after the lines had just about given up hope. \$100,000 will be added to the bonus of 120 per cent, with company offered, with a top limit of \$15,000 in any one company.

The first-year rate is supposed to be withheld down every year to a final figure of 10 per cent rule, but there's a point in the announcement that the withholding will be reconsidered if new equipment is put on. The rate doesn't look very impressive, but as a general rule, it's not the amount of the withholding that is the important part. The new financing authority for aircraft lines began here, on granting no first-time person. Since they give a provision of a 10 per cent rule for seven years, and are necessary to draw a subsidy, the lines at that they had to make sure at least they had their piece. They did a lot of speaking—everyone did objections to every little detail, and to the whole situation up further a lot of other people's objections to protest because they had been passed up on the aviation map. The Air Ministry let them a deal with British Airways for the first year of the London-Lisbon run. For a daily round trip by Lockheed 10, the Air Ministry will pay \$15,000, from which will be knocked off all that British Airways takes in tax and pay, half of what other traffic brings in over its own, and half of any saving in expense made. The intention of expense run higher or lower than figured. British Airways has to stand the loss. The contract is pretty typical of recent subsidy agreements, they all are worked out to give the Air Ministry the benefit of any trouble and loss, but it's better, like that if people don't come up to estimate, while at the same time they give the airline an incentive to keep expenses down and go out of the line.

With this lot of the proposed French American war, as against, French people will start in the London-Berlin stretch. The report by the morning that looked over the South American version is as well as being delayed.

Japan is not in the lot of accounts to only their aviation. All around and foreign lines will just up in the Japan Air, too, which a lot of companies plan are interested. Out in the long-run, not only to the immediate Pacific islands that has been about to start for a couple of years now. Already a considerable network of lines is operating in Indonesia and the occupied part of China, a lot of it with modern American equipment. They will look up before long with the more foreign air routes by running into occupied territory (and outside) throughout, giving the United States a lot of connections with all the rest of the world without having to return the complaint by sending foreign lines.

The air movement rate is still being raised. France expects to spend around eleven billion francs on her air force in 1938, against around five in 1936. Italy has some right back with a 1931 expense to give two billion lire. Britain, having already spent her R.A.F. budget (AVIATION, December), is now making the first move in reorganizing her general aviation. The Fleet Air Arm, which has been a sort of supporting wing of R.A.F. operating with the fleet, is to be transferred entirely to the navy by next January, a report that is to be completed in 1942. A bill has gone out to increase to bring the strength up to 16,000. Few of the R.A.F.'s bases will be handed over to the navy, which will start some new sort of air arm.

An engine leader has appeared off the main airport recently with speed limit, there's been a lot of competition.

for them in recent years as they've come to a sort of the same thing in the efforts to improve the breed of light bombers. A lot of models of the Bristol 100, 150 with three Pratt & Whitney engines of 1,000 hp, several 4,000 hp for 1,500 miles an hour in speed of more than 200 mph, having by about 20 mph, the previous record held by the French Avion 170. With the same load over 200 miles an hour, carrying about 200 tons, by an earlier model of the same ship with less power. The American war the birds was the resulting out of all the cross-Chinese services due to a blizzard. The day after Christmas, the first time all the lines have been worked in for two years—a record of some kind, if only for outposts in the developing effort.

The forward loading of the Gweller at sea Jan. 31, 1938 ended among the dramatic scenes of ten of the thirteen persons aboard it—three Londoners, four New Yorkers, and three others. The fact that we carried the trouble opened up the old birds over (perhaps) a hundred years in the past, but against that, the fact that the accident occurred in the same ship, even so, it's a shock, made the whole thing seem that much more painful—and the details just that much more serious and complicated.

1,000 hp engines have appeared on the ground, though neither of the ones at the Portsmouth had been built. One is a liquid cooled Napier 24-cylinder with 24 cylinders arranged in 12 banks, one to each. It has a lot of other things built in, such as two crankshafts and two main shafts, and two main shafts. The model shown had a long run to prove working the engine very well in the ship. (There's talk of using this on the French tank destroyer boats), while another is planned for two apparently running props. . . . The main engine is planned for the new 14-cylinder Chrysler 1700, a liquid cooled V, but it's entirely very much in the experimental stage. The engine cylinders, giving it the look of a turbine from the day when the Liberty was the wonder of the world.



BRITAIN'S LATEST: The new Bristol de Havilland "Flamingo" carries seventeen passengers in normal operation. Two Bristol Perseus 300 above view engines each developing 305 hp. Cruising speed is "over 200 m.p.h."

AVIATION
ENGINEERING

LES REWILLE



C. A. A. Presents Training Program

Profound endorsement of the C.A.A. pilot training program had not taken operators and non-college students into account when they filed in and aviation and aviation have been flying fast and furiously. The air was cleared somewhat by Generalissimo's speech in which he assured the operators that their ships and services would be used and established respectively who qualified would be added to the facilities of the colleges selected. But we don't quite know how serious that kind of operation would result in having "Professors" perform to their names.

Way back when this plan was at the conference, Generalissimo spoke we were in Washington to discuss it and brought up the question of what it had to offer

the boy who hadn't gone or couldn't go to college, because we knew a good many of them whose desire to fly was just as intense as those who were in college. And we had the general endorsement of the C.A.A. that non-college students would be welcome under reasonable circumstances if they could meet the C.A.A. requirements which are the process of being set up.

The important point to remember, however, is that all this is experimental and no funds are available yet beyond

(Turn to page 82)

To Readers of Aviation's "Market Place"

Ten Fortunate Veterans classification of the January 1938 issue of Aviation's market place advertisement involved in the regular way for the pilot wanted to fly planes to San Francisco under exceptionally favorable conditions as to future employment. The advertisement appeared with the name and address "E. E. Lushere, Prof. of Aeronautics, Alhambra College, Alhambra, Calif."

Alhambra College was contacted with interest and promptly advised us as follows: "Mr. Lushere is not connected with Alhambra College in any manner, the College offers no instruction in aviation, and has given no consideration to the establishment of such courses. Moreover, we have searched Mr. Lushere and he has no knowledge of the matter whatsoever."

From the above it is apparent that the advertisement was a hoax. Aviation takes this opportunity to tender its sincere regrets to Alhambra College, Mr. Lushere and to those readers who may have been disappointed in any way through responding to it.

MAKES SEAPLANE RECORD: (Left) Bernt Eider and the Lynx by Eider-Whitney used in his 500 mile international record for light airplanes.

N. Y.—MIAMI WINNER: (Below) Max Constant and his Pech & Whitney powered biplane.

MIAMI SCORE SHEET

Bronx All American Air Museum: Miami, Fla.

McKee's New York-Miami Trophy Race

Green Trophy Race (100 in. in displacement or less)

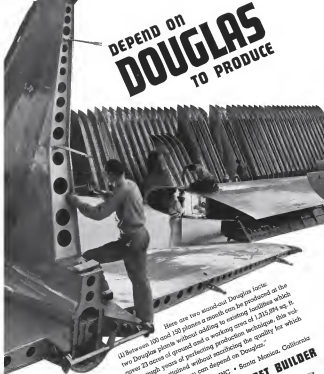
Benjamin Trophy Race (Sportsman Pilot)

Glen H. Curtis Trophy Race (120 cc. in. disp. or less)

E. E. Culver Trophy Race for Women (handicap as disp.)

Puritan Trophy Race (Hoad)

Reddy Lind Trophy for Aerobatics (Winner judged by crowd)



DEPEND ON
DOUGLAS
TO PRODUCE

Here are two stand-out Douglas facts:
(1) Between 100 and 150 planes a month can be produced at the two Douglas plants without adding to existing facilities which cover 23 acres of ground and a working area of 1,215,004 sq. ft.
(2) Through years of perfecting production technique, this volume can be obtained without sacrificing the quality for which the world knows "you can depend on Douglas."

DOUGLAS AIRCRAFT CO., INC. • Santa Monica, California
AMERICA'S LARGEST AIRCRAFT BUILDER



NIGHT FLIGHT PATH: During the recent Lights, Inc. demonstration at Santa Maria Airport, one West Coast afterglow of the sun of an airplane's lights. The upper line at the left shows the takeoff, the lower line the landing. The white line in the takeoff line indicates a correction.

the first \$100,000 grant of N.Y. & N.J. for test period between June and June.

In connection with the flight training program, the C.A.A. is instituting a special controlled-contraction course designed to enable all candidates to pass the private pilot's test with ease at 35 hours. The course requires 5 hours of flight plus 5 hours of dual check time by the instructor and 10 hours of solo, the dual check time alternating with the solo in a ratio of 10 minutes dual time to each solo hour. As an incentive for the instructor, he will be paid for 50 hours of instruction even if only 30 hours is needed to pass.

Given by colleges, selected on the basis of their former work in aeronautical engineering and flight training are: Purdue University, University of Alabama, University of Minnesota, University of Wisconsin, Massachusetts Institute of Technology, Texas A & M College (Arlington, Tex.), Cornell, Georgia School of Technology, New York University, University of Maryland, University of North Carolina, University of Kansas, San Jose State College, Fresno State College.

They attempt will take on the difficult program of a recent racer in schedule. The more it the C.A.A. will receive, more advancement to a Class B permit or before February 1. This would require construction of two good second-class aircraft at a cost of about \$100,000, construction of a new hangar and installation of a super dual beam, of the type

now being installed at airports along the major airways. Funds for certain of these airports have been converted from the \$100,000,000 requested by the President. The remaining airports and airports being throughout the country.

With the GAA report on airports in the offing, and some form of Federal report assistance hoped for, announcement of the Dwyer Airport Aid Plan is particularly timely. This plan, sponsored by Non-Inhabited Aviation, Inc., of Los Angeles, has been developed under the direction of E. A. Dwyer, former

operator. Under the Plan the GAA would control all situations of Federal funds for Municipal airports, including all non-inhabited airports is restricted to drainage, grading, and runway surface improvement. Quality and character of track improvements is and would be on a three-year warranty and a continuing condition is prior to construction of at least \$10,000 in private capital for highway facilities. Municipal aid to a single private airport is set at \$10,000. Assistance is currently being held from a few years or less would be limited to \$10,000, with provision for completion of the airport to the full \$10,000 assistance for longer term periods. Federal funds for maintenance of airport runways is limited to 10 per cent, annually of the total amount allocated for the airport improvement. Provision is also made for Federal maintenance of commercial runways installed originally with private capital.



HEADS LICENSE AIRMEN: J. F. McKeown, our own West Coast Editor, is now president of the Licensed Airmen of America. J. F. McKeown is vice-president; J. G. Hall, secretary; W. D. Latham, treasurer. New officers and retiring president P. E. Williams contribute the news this month.

THE REPORT CARD

37 Air School Developments

New equipment has been installed at Army Industrial Technical Institute, Los Angeles, for the broader scope of master mechanics and engineering course in which instruction commenced January 2, 1950. According to an announcement by James McKeown, chief instructor, enrollment is at an all-time high with more than 100 students enrolled. Students and instructors, including part-time or correspondence students, currently active. Additional work in engine repair and maintenance, mechanics, aviation, propulsion, and specialized instruction. Study has been added to the master mechanics course, which extends over a full year and requires 3000 hours or more of active instruction.

1950 was the most active year for Curtiss-Wright Technical Institute for Aeronautics according to a report from C. D. McKenna, Registrar, Licensed Air Ground Control Air (Chicago), Glendale, Calif., the Curtiss-Wright Technical Institute currently has more than four hundred resident students under instruction, more than at any other time in the school's many years of successful operation. This year one new student body turned out for a "Rodeo" and has been on the airport grounds for the students by Major G. C. Mowley, president.



PRECISION—FIRST AND LAST

Building airplane engines to a high degree of precision is only part of the manufacturer's responsibility. Making sure that they will maintain that precision is even more of equal importance. Reputations are built on trouble-free performance.

It is this consideration which leads engine manufacturers to standards on Chrome-Aluminum-Molybdenum nitriding steel for cylinders, gears and other vital parts.

The steel is tough and strong. It has high fatigue strength. It takes a very hard, wear resistant case and retains its hardness and resistance to wear at

elevated temperatures. The Molybdenum content gives it good depth hardening characteristics and practically eliminates temper brittleness.

Chrome-Aluminum-Molybdenum nitriding steel has production advantages for parts that require considerable machining to close tolerances. It machines readily in the best treated condition, and distorts from nitriding is negligible.

Detailed information on this and other steels used in airplane construction is given in two books, "Molybdenum in Steel" and "Aluminum Steels"—free on request from executive and production heads.

PRODUCERS OF FIBRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

Climax Molybdenum Company
500 Fifth Avenue, New York City



CONVOY LEADERS: The Leading Trio featuring Jim Fennel (Aerobics), Bob Dwyer (Solo), and George Lewis (Thyristors).

and now
the DC Antosyn



PIONEER REMOTE POSITION INDICATOR

- ★ ONE DIAL FOR 11 INDICATIONS
- Flip Position
- 3 Individual Wheel Positions
- 6 Individual Wheel Lock Positions
- Definite Power "On" and "Off" Indicator
- ★ DIRECT CURRENT ELECTRICAL OPERATION
- Independence of Voltage
- 2 Wire System
- No Rods or Cables

PIONEER INSTRUMENT COMPANY, Inc., BENDIX, M J
(Subsidiary of Bendix Aviation Corporation)

Marching as to War!

(Continued from page 27)

planes and on powered machines. From these groups the selected boys enter the air service proper after which they may go back into the flying schools, organized and operated under RUSMA, suggested.

I did not run across any figures on the strength of RUSMA when I was in July last year. Six days, in a recent article in "U. S. Air Service," states that in April, 1936, the membership was 34,000 and today is over 120,000. Whatever the actual figure may be, it is certain that a great deal of activity is taking place under the RUSMA for every airport that I visited in Italy had one or more hangars dominated with these emblems.

An Air Service organization, the most elaborate and the best organized aviation school that I saw in Europe, outside of Germany, were those of the Italian fascists. I went through the school at Savona-Mercato di Sesto Calende in some detail, and also had a glimpse of similar arrangements at several of the other large plants. Although the Savoia-Marchetti school was not physically separated from the plant proper as was the case at Grosseto, it was operated on almost the same basis as far as planning went, except that most of the boys seemed to live at home (Sesto Calende has been an aerial manufacturing center for over twenty years and there are numbers of second generation aircraft workers available in the town), and furthermore, the more advanced apprentices seemed to be doing more actual production work for the factory than was the case in several of the German schools. Again, however, the equipment provided for the apprentices courses was at the best and the boys under training seemed to be having only a very big crash of work.

As to what goes on at Savona, we can only guess. The propaganda picture looks certainly give the impression of freedom upon thousands of ex-fascist flying. Business looking aside, learning to fly or making parachute jumps. The only actual figure that I have ever seen were those presented in the Soviet exhibit at the Paris Show of 1936. A series of charts was on display showing progress over a three-year period of from 1933 to 1936. Looking back over my notebook, I find that a few

of the figures are as follows. Participants from airplanes from 1,800 in 1935 to 20,800 in 1936; parachute clubs from 30 to 2,500 in the same period, gliding schools from 359 to 2,600, gliding pilots trained from 2,500 to 30,000. No figures were given for the number of airplane pilots trained, but the statement was made that almost two times as many pilots were turned out in 1936 as there were in 1933. What that may mean as reality is, of course, anybody's guess.

But whatever the statistics of the Italian situation, one thing is reasonably certain. As in Germany and Italy, all the training that goes on is done at the expense of and under the immediate control of the state. Private flying, as such, is dead in the debtor countries of Europe and seems to be on the point of disappearance in the few remaining European democracies. And, as M. Borelli pointed out in a recent address, the most serious thing about it is that he sees it as all abandoned. Under the pressure for uniformity by the totalitarian states, he sees the end of private flying in Europe and the beginning at the point of view he calls "the Italian general obsolescence"—that is, true and obligatory.

Certain it is that France and England who have been operating for the past five or ten years on the principle that their civil aviation can assure them a nucleus of trained pilots on whom they may depend in emergency, have fallen far behind Germany and Italy in personnel training programs. Two years ago, when Pierre Cot came into the French government for the first time as Air Minister, he recognized the situation and made an effort to balance up an already lagging nucleus in private flying by the establishment of an extensive program of what he called "Aviation populaire." Basically he was a plan to subsidize light transport for French youth under 21 in some way or other and make private flying clubs. In addition, the A.P. was to perpetuate the teaching of aeronautical subjects in schools and the building of model airplanes. Membership in these clubs is entirely voluntary, and it open to everyone. A number of such clubs have already been formed and have been operating more or less in competition with the established aero clubs throughout France; the organizations that are attempting to carry on private flying more or less as we know it over here.

In the year 1937 the Aero Club of France reported 1,129 pilots of 23 years of age or less. The assumption can

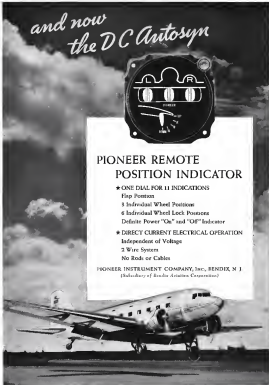
be made that most of these pilots came from the A.P. But, after that same period the Air Ministry budget to meet A.P. activities totaled some \$5,000,000 francs, a fairly expensive procedure. At the same time, the old private aviation through existing aero clubs amounted to only \$1 million francs, and over 1,200 pilot licenses were issued in this group.

Let's take, in a comparison of the system of private flying as against subsidies of the A.P. money, showed recently that if the existing aero clubs should be given a subsidy of only 5,000 francs per member trained to the point of licensing (as compared to the 50,000 francs per license under the present A.P. system), then only about 3,000 pilots for 15,000,000 francs total and could, at the same time, reduce substantially the cost of flying per hour. It is maintained that the life of the flying clubs would be insured and that private flying in France would be put on a sound and sound basis. As with most comparisons, the French scheme seems to be having its difficulties and as a result, there seems to be a movement toward complete abandonment of some sort along the SCAPF pattern, so that that can be accomplished only by the complete elimination of what little remains of French private flying.

The British seem to be heading in the same direction. For years they have been playing along with a subsidized light aircraft club plan which has not produced any satisfactory results, as far as mass training of pilots is concerned. Now, with an emergency expansion of its air force a necessity, to meet a sudden demand for pilots in large quantities the Air Ministry has hastily evolved as a plan, the formation of the so-called Civil Air Guard.

Whether or not the British will make the idea work remains to be seen. In essence, however, they expect to recruit (voluntarily) thousands of men and women between the ages of 18 and 30 (if they can qualify physically) and form them into units to be attached to existing flying clubs. The C.A.G.'s were to act as a reserve in any required capacity (at home) as an emergency and in certain cases to take light instruction at a very nominal rate, perhaps 500 francs per hour minimum up to \$250 maximum depending upon the conditions used and the time during the week that they choose to fly. It is just half as expensive to fly in the middle of the week than it is over weekends.

According to the London "By Times" (page 105)



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Marching as to War!

(Continued from page 107)

cluded" (see December 31, 1936, issue 508). C.A.G. applications had been received of which approximately half were expected to be physically qualified for pilot training. As of early November seven organized clubs had some 140 Air Guards in actual flight training. All but two of the fifty-eight advanced light airplane clubs in England are participating actively in the scheme.

I gathered, however, from conversations in England, that all wasn't beer and cherries with the C.A.G. The scheme had been put together hastily, and few people had much idea as to what it was all about, including many of the members. Flight for December 28th earned a glowing article under the title "C.A.G. Hopes-Cries-Webs" as they were so to do it. It simply echoed the sort of thing I had heard. The whole show seemed badly organized on its face. There weren't enough machines or instructors. The atmosphere varied widely from club to club. Not that there is anything essentially wrong with the whole idea, but that it had been put into being so hastily that too many things were still hanging in mid-air. Perhaps it has improved for this time.

The British have done rather better with their private force training and have worked out the sort of thing that I think we will have to do here, and that is to lay out the first 50 hours of flight training, and the majority of the "special school" work to the well organized and well qualified civilian and flying schools. I was in civil flying schools both at Delftland's at Hatfield and Brenda's at Filton, and both schools were operating in expansion with orders for the air force and members of the Volunteer Reserve, paid for, at its round a head, by the Air Ministry under contract. I was told that it would be impossible for an ordinary civilian to enter one of these schools (and there are more than 30 schools on such a basis in England today) because all the available capacity had been contracted for by the air force.

The Volunteer Reserve mentioned above is open to young men between the ages of 18 and 25 who can qualify physically for Air Force training. They do not serve full time, but most of them have civil jobs and put in their flying time every weekend and holidays. They are given instructions on civilian and an older service types (This is page 109)



Fig. 1-5: Curtiss V1-A1B

THE transparent enclosures in the Curtiss V1-A1B are made of Plexiglas, the acrylic sheet plastic which possesses the advantageous properties of light weight, high impact strength, excellent aging resistance, and ability to be formed into curved sections.

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Traffic Violators Beware!

(Continued from page 21)

and possibly those with lesser territories to guard, may well consider that the time has come to demand flying equipment. Increasingly there appears to be a trend that makes it difficult to be gained by such airplane flights as enforcement missions.

Police expenditures have increased and down airplanes on the part with considerable success. The New York state police had a plane for some time, but the experience was mixed with only a few enforcement accidents.

Light, fast, economical airplanes in the sport type are available today. Any well-equipped police department with large territorial responsibility would consider with interest the new opportunities opened to it in such planes and a competent flying force were made available.

For example, high and responsive officials can be transported to strike areas or other explosive points within a few minutes or hours after the emergency occurs. Key witnesses can be rushed where they are needed, before reports and trained companies, etc., can be taken to the place where their specialized knowledge is available or utilized in time. Expenses can be limited and road parties assisted by personnel who operate in the sky. Equipped with radio-communication, the Pennsylvania plane will prove of immense humanitarian and psychological value to its own as it possesses the best of medical care in case of injury. When an officer falls wounded by gun fire in a rural roadside, he can be transported by plane to one of the hospitals at Harrisburg where he will be under the care of Doctor David H. Johnston, recently appointed as Surgeon and Medical Officer of the Pennsylvania Motor Police force.

The transportation of prisoners can be facilitated with greater ease and economy.

The Police Air Unit can render valuable service to the Highway Department by making photographs of the areas through which roads are to be constructed, thereby expediting surveys at the best rates to establish.

Types of Plans

The types of plans to be used increasingly vary somewhat with the

circumstances and land conditions existing in the various states.

At present the problem is in an experimental stage, but in Pennsylvania we find a strange but (rapid) four or five-passenger plane, having a cruising speed of about 120 miles per hour and a turning radius of about five hours and about 250 horsepower, to be very satisfactory.

Due to the large number of men and also to provide a greater factor of safety for night flying, two mixed planes have been recommended. Such planes would at once have a larger passenger-carrying capacity. On the other hand they would require a larger crew and would consume a much larger amount of fuel and on the whole be more expensive to operate.

Airships as Auxiliary

The dirigible type has also been suggested for use as an auxiliary to the standard type of monoplane. There are a number of advantages factors which are claimed for the dirigible, especially the so called "cruisers" type, and demonstrations of this kind of flying machine in the hands of expert operators offer a very interesting picture of its value for the air.

Passage by the last Congress of the Dwyer Act appropriating \$1000,000 for concentrated development of the dirigible has brought hope to friends of the craft that it will soon become widely useful in civil life.

The report of the Senate Military Affairs Committee on this measure throws some light on what may be expected from the dirigible-wing planes. The Committee wrote:

"As the result of tests made at the Coast Guard Air Station at Cape May, N. J., it was found that the rotary-wing aircraft possesses decided advantages in low altitude work, where no obstructions were offered by low-flying aircraft from the air and broadening the range of landing places, that it would lend for aerial photography, food-and-water work, heavy patrol, the accurate and safe dropping of supplies, medicines and supplies to localities unassisted by roads, as roadways are now as well as searching for wrecks or persons. Testimony on behalf of the United States Forestry Service shows that type of aircraft

will have a distinct and most helpful utility if properly developed in low-altitude work."

The United States Coast Guard has made the finest record of any law enforcement group in policing by air. It is noteworthy that this organization of forest men and track boys is one of the few to have its own air force.

Assigned 30 airplanes and 21 pilots, the Coast Guard patrolled one national holiday during 1936-7 to complete a considerable record in checking individual smuggling of narcotics, liquor, skins and contraband articles of all sorts.

In the modern day of accommodation in travel, transport of goods and warfare, law enforcement is checking its responsibility if it does not use our aerial forces from its ground base and large for itself a new way to fight the crooks—a means which the underworld cannot copy or combat—and to render effective service in one way to auto traffic on the congested highways.

Marching as to War!

(Continued from page 107)

in the schools of no sort to themselves. In fact, they may draw certain small amounts to cover their out-of-pocket expenses, and are paid \$25 (about \$20.00) a year as a sort of retirement fee.

By now, there seems to be a way to be learned, as far as we are concerned, from the British scheme that from the others. There, at least, some effort has been made to make use of the existing commercial facilities and to let them retain their identity without attempting to incorporate them into the fabric of the State. The British have suffered, not because their plan was bad, but because they would not they were actually never allowed to make any sort of plan at all. Again, we have an advantage over all the rest. We not only have this experience on which to draw, but we have (and for some time to come, we hope) we are not under immediate threat to get something done—or else. If we don't take advantage of our favorable situation and assemble all hands to work out some solution that will keep our Service personnel up to speed strength, and, at the same time develop for ourselves a private flow industry second to none in the world, then we are a lot dumber than I think we are.

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1938			
January	5	14	4
February	1	9	1
March	49	16	8
April	6	13	3
May	6	13	4
June	28	5	4
July	4	8	4
August	2	3	1
September	29	12	5
October	5	4	3
November	3	6	4
TOTAL	136	111	29

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AVIATION
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THE safety of planes coming in to land at 50 to 90 miles per hour requires a smooth-riding runway. Almost any type of construction can provide an even surface—when it is new. But will it stand up under the wheel loads of heavy planes and the action of frost?

You've seen highways that became wavy, rutted and bumpy under trucks. On the other hand, you've seen how concrete highways can "take it."

The wheel loads of today's planes are greater than those of biggest trucks, and still heavier planes are coming! For economy's sake, give your runways the beam-strength of concrete. Maintenance cost is low because concrete stands up under heavy loads unaffected by extreme weather. First cost is moderate because concrete may be accurately designed for given wheel loads and landing impacts with ample safety factors.

And concrete provides maximum safety, night and day, wet or dry. Its gritty secured surface is uniformly non-skid, yet doesn't damage tires; it provides exceptional visibility; is free from dust and dangerous flying particles. The permanently set gradients and true, even surface of concrete provides good drainage without excessive costs, and eliminate pockets of standing water. Let us send booklet, "Concrete Makes a Modern Airport."



Kearney City, Mo., joins the rapidly-growing list of cities that are turning present and future air leadership with modern concrete runways. Project includes 210,000 sq yds of concrete runway and taxiway of 8-6 ft width. Runways are 3200, 3650 and 3900 ft long by 150 ft wide. Also two taxiways 1000 and 1900 ft long by 100 ft wide. Draft fees show pavement under construction at time photo was made. Project under H. W. McLeod, Assistant Director of Public Works, Kearney City, Mo., Judge H. F. McElroy, City Manager. WPA project under State Administrator, Matthew S. McHenry. Charles D. Guffy, Airport Manager.

PORTLAND CEMENT ASSOCIATION • Dept. A2-41, 33 W. Grand Ave., Chicago, Ill.
A National Organization to Improve and Extend the Uses of Concrete

ENRITION
January 1938
110

"They Contribute Materially to Good Ground Characteristics"



The Goodyear Tire & Rubber Company, Inc.,
Aeronautics Department,
Akron, Ohio,
declines:

As you know we have adapted Goodyear equipment on the new 1938 Cessna Aircraft and will be set for you have well pleased we are with the performance of this Goodyear equipment.

We believe it has made a real improvement in our new ships. The reliability and smooth action of your brake centrifugal externally to the good ground characteristics and quick stopping ability that plate makes in the new Cessna.

Yours very truly,

CESSNA AIRCRAFT COMPANY, INC.
Arthur H. Hargrave
President

PLR PL



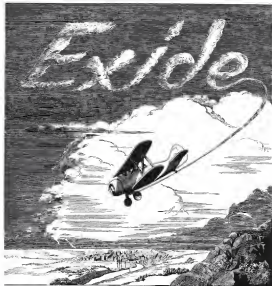
new 1938 Cessna Aircraft applied with Goodyear hydraulic landing gear, wheels and tires.

ON YOUR NEW SHIP SPECIFY

GOODYEAR

AIRPLANE BRAKES • WHEELS • TIRES

ENRITION
February 1938
110



Exide specially designed battery, specially selected for military aircraft

EXIDE BATTERIES fly the airways of the world. For national defense, air transport, ships of business executives, and sportsmen pilots, these batteries offer dependability and safety in full measure.

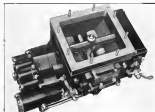
From the first aircraft battery in 1917, for Aquila only, to the high-weight heavy-duty, integrally divided, non-spill assembly of today—Exide Aviation Batteries have kept abreast of the exciting requirements of the industry. There is an Exide for every type of ship.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturer of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide AIRCRAFT BATTERIES

AVIATION
February, 1937
121

15 MILLION CARBURETORS



A RICH BACKGROUND of SPECIALIZED EXPERIENCE

The policy of aggressive and continuous development which has characterized Holley operations for thirty-five years, in the manufacture of fifteen million carburetors, is adequately expressed in the new Holley downdraft, streamlined-throttle, C-G Aircraft Carburetor.

Safer because of its working characteristics . . . productive of more power because of the elimination of the need for heat . . . more

maneuverable because of its diaphragm fuel feed . . . this new carburetor combines many desirable advantages.

Each carburetor is individually tested under 50 different conditions of throttle opening, air flow and altitude, in the largest flow-bank in the world . . . another important and exclusive Holley testing feature.

Operating executives will be sent further engineering data upon request.

AIRCRAFT DIVISION

HOLLEY CARBURETOR COMPANY • DETROIT • MICHIGAN

HOLLEY C-G
aviation carburetors

AVIATION
February, 1937
121

BASIC MATERIALS FOR AIRCRAFT MANUFACTURE

Air Associates either manufactures or distributes practically every one of the materials, accessories and basic items of aircraft hardware used by airplane manufacturers, air transport lines and military air forces.

Stocks of standard Army and Navy Specifications hardware, including bolts, nuts, drive bolts, eye bolts, washers, drive pins, turnbuckles, thumbtacks, flat washers, machine screws, threaded taper pins, washer head screws, lockwashers, cotter pins, rod ends, fuel line fittings, claspless, cable bushings and the many other standard items of this type are carried at all Air Associates branches, ready for quick shipment. Since the majority of these are of our own manufacture, quick service can be given on special sizes or unusual quantities.

Quick delivery is available, also, on the many specialties such as hydraulic pumps, valves and operating cylinders, wheel, axle and landing gear, fuel tanks, fuel pumps, fuel pump drives, fuelmeter shafts and propeller brakes, which are made in our own shops and which are in most cases—of our own design.

Air Associates also acts as direct factory representative and exclusive sales agents for leading manufacturers of aircraft radios, tires, instruments, fabric and fabric tapes, aircraft batteries, sheet steel, steel tubing, bar stock, control cables, pulleys and other aircraft accessory material. Should you require any of Air Associates branches and quick quantity shipments are made directly from factory stocks.

All materials sold are of new production, manufactured in strict accordance with the latest U. S. Army and Navy Specifications, and meet all requirements of the U. S. Bureau of Air Commerce. Certified new repairs are furnished with all materials on which these are required.

For quick service, dependable quality and advantageous prices on all basic aircraft materials and equipment, try Air Associates first.

AIR ASSOCIATES

MANUFACTURERS • *Aviation Supplies* • DISTRIBUTORS

L. W. Field
Dallas, Texas

230 W. 12th St.
Chicago, Ill.

1000 Park
Garden City, N. Y.

1100 Alameda
Oakland, Cal.

West North St.
Mankato, Minn.

DOUGLAS CHOOSES BERRY BROTHERS BERRYLOID AIRCRAFT FINISHES



Because they stand up better under the Ray-test of sun, heat, cold, they are used in finishing and coating 75% of all American-built and many foreign-built airplanes.

Write
BERRY BROTHERS
GUTHRIE, MICHIGAN
WALKERSVILLE, ONTARIO

Douglas Aircraft Company, Inc.
1000 Main Street
Long Beach, California

Berry Brothers, Inc.
215 North Second
Detroit, Michigan

ATTENTION: T. E. TERRY, JR., Executive Officer

Dear Sir: Douglas we have used your brand of "Berryloid" in our finishing work for the past several years. The material is excellent and we have used it for all our aircraft. We are now looking for a new supplier of this material and we are interested in your product.

It has been found that your "Berryloid" is a finishing material of superior quality and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product.

The name of your "Berryloid" is not known to us. We are now looking for a new supplier of this material and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product.

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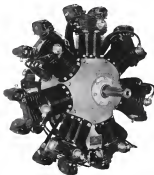
We are now looking for a new supplier of this material and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product.

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We are now looking for a new supplier of this material and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product. We are now looking for a new supplier of this material and we are interested in your product.

Years of LEADERSHIP Indicate Pilot Preference



SERIES "50"
90 H.P., 125 H.P., 145 H.P.



ENGINES

W A R N E R
AIRCRAFT CORPORATION • DETROIT, MICHIGAN

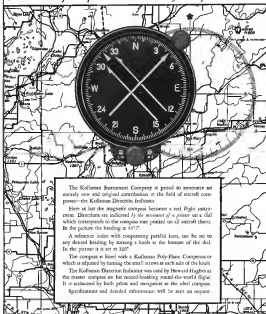
Manufacturers of Aircraft Engines, Air-
plane Wheels and Brakes, Shock Struts,
and many other Aircraft Accessories.

AVIATION
February, 1934
136

In 1938, as in preceding years,
Warner Scarab Engines led the
field in their horsepower range
... this fact is indicative of only
one thing—a nation-wide pilot
preference which Warner Engines
have gained through years of out-
standing performance, depend-
ability and economy in operation.

KOLLSMAN DIRECTION INDICATOR

A New Aircraft Compass to be read like any other panel instrument



The Kollsman Instrument Company is proud to announce an entirely new and original contribution in the field of aircraft compasses—the Kollsman Direction Indicator.

Here at last the magnetic compass becomes a real flight instrument. Directions are indicated by the movement of a pointer on a dial which corresponds to the compass rose painted on all aircraft dials. In the picture the heading is 44° .

A reference index with cooperating parallel lines, can be set to any desired heading by turning a knob at the bottom of the dial. In the picture it is set at 300° .

The compass is fitted with a Kollsman Poly-Phase Compensator which is adjusted by turning the small screws at each side of the knob.

The Kollsman Direction Indicator was used by Howard Hughes as the master compass on his record-breaking round-the-world flight. It is acclaimed by both pilots and navigators as the ideal compass. Specifications and detailed references will be sent on request.

KOLLSMAN INSTRUMENT CO., INC.

8008 FORTY-FIFTH AVENUE

ELMHURST, NEW YORK

WESTERN BRANCH: GRAND CENTRAL AIR TERMINAL, GLENDALE, CALIFORNIA

AVIATION
February, 1934
137

FIRST Stainless Steel Ship



Being hoisted the "Pioneer" entered service and together with it you meet the Howard O. Howard, former business executive, who has been named as the first pilot to make the trip. The ship is being hoisted by a crane at the Howard O. Howard Co. building in Chicago. It is believed to be the first stainless steel ship ever built.

"No sign of wear, no deterioration, no corrosion of structural parts or welds" — that's what engineers found when they recently dismantled and inspected the "Pioneer," first stainless steel airplane ever built. "So perfect in its structural condition," they report, "that with a new power plant, the ship will be ready to fly again for an unlimited time."

Now six years old, the "Pioneer" stands an indisputable proof that

stainless steel construction is endlessly proved. For this ship spent three years undergoing grueling tests and in active service. More than 25 pilots flew it in America and Europe. It was hoisted, hoisted, and hoisted as a power plant. It was even loaded several times with its landing gear retracted, as demonstrate the strength of its hull. Twice it crossed the Alps, fully loaded, in 16,000 feet. Three years ago, the "Pioneer" was

stripped of all fabric covering and placed on exhibition in front of the Franklin Institute, in Philadelphia. It stood there for three years completely undamaged, exposed to all kinds of atmospheric conditions, rain, snow, ice and dust. Yet today, engineers of national reputation declare the ship "amazingly perfect."

No wonder: top light structural engineers are now thinking in terms of stainless steel construction.

U-S-S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago and New York
CARNegie-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago



Columbia Steel Company, San Francisco, Pacific Coast Distributors; United States Steel Products Company, New York; Export Distributors: Bailey, Brindley, Wilson, Sullivan, Chicago; and others throughout the country.

UNITED STATES STEEL

AVIATION
February, 1939

122



What about Howard for 1939 ?

THE HOWARD combines the aerodynamic features of the racing plane with the flying characteristics of an airliner. Ben O. Howard, its designer, utilized his experience as an airline pilot and as a builder and flyer of racing planes in creating the present HOWARD, which is patterned after his famous "Mister Mulligan", which won BOTH the Transcontinental Bendix and Thompson Trophy Races in 1935.

Because of this background, interest in the HOWARD has mounted steadily and now that it is to be produced in quantity, rather than custom built to order, we are using this page advertisement to give some pertinent facts about this popular 4-5 place Personal Transport.

THE HOWARD IS NOT A RACING PLANE

The HOWARD is the fastest plane of its type, however, it was not designed for racing but for every-day flying. It gives a smooth ride, even in turbulent air, and is super-stable with "finger-tip" controllability which flyers like. You will enjoy its ability to "arrow" through tough going.

NO—IT DOES NOT LAND "HOT"

With an official landing speed as slow as any in its class, the HOWARD can be landed safely by the average pilot anywhere that competitive makes will attempt. Owners of these planes are not Professional Pilots, but the average "business man type" of flyer.

INSURANCE RATES AS LOW AS ANY

New HOWARDS for 1939 can be insured for full hull coverage, including crash, if you desire. It's fine under all circumstances: windstorm, tornado and cyclones; LAND DAMAGE, collision

and hull and theft, for acceptable private owner risks at as low inclusive rate as low as any, which is further evidence of the acceptability of this product.

WILL IT BECOME AN "ORPHEUS"?

The group sponsoring HOWARD are prominent and successful Chicago business men whose interest in aviation as a whole assures HOWARDS' posterity, however, they are not standing still but are arranging for added working capital, strengthening the organization and improving facilities, determined to forge ahead.

TAKE A LOOK AT HOWARD FOR 1939

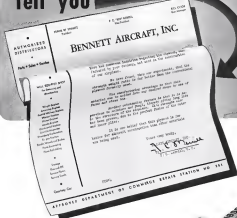
Many notable refinements built into the 1939 model enhance its desirability without decreasing its superior performance. Investigate the HOWARD by inspecting and flying the latest model—ready early in February. Ask us for information. We will gladly answer questions without obligation on your part.



AVIATION
February, 1939

123

LET another manufacturer tell you



• The last word about Haskelite Aircraft Plywood is out for us to say. We can assure it, explain its value and reveal its advantages, but the final word must be said by the people we make it for. We make Haskelite Aircraft Plywood to please others and serve them faithfully. Whether it is an outstanding product or not only a user can say.

In the letter above you have the answer. And the next logical step is certainly to get full information before you about our latest developments. Write us



HASKELITE

AIRCRAFT
PLYWOOD

HASKELITE MANUFACTURING CORPORATION
208 West Washington Street, Chicago, Illinois • Offices in Detroit • New York
Plywood Shipped on West Coast by Western Hardwood Lumber Co., 2044 E. 15th St., Los Angeles, Calif.

AVIATION
February 1935
128

Now... a new and larger ERCO plant

with increased facilities to meet the exacting demands of the industry



Lightweight Schwarz Type

PROPELLERS

(Composite wood and plastic)

Adjustable, Corrosion-Resistant, Constant Speed

★

Auxiliary Power Plant

ENGINES

(Compact, Light, Dependable)

★

Sheetmetal working, and Riveting

MACHINERY

(Designed especially for Aircraft Work)

★

ENGINEERING AND RESEARCH CORPORATION

Riverdale, Maryland (near Washington, D.C.)

Telephone:
GREENWOOD 444

Cable Address:
ERCO-WASHINGTON

AVIATION
February 1935
129

BELLANCA OUTSTANDING AIRCRAFT



Offered by the Builders of World Record Breaking Airplanes.

BELLANCA ACHIEVEMENTS INCLUDE:

- * First and Only Men-Ship Trans-Pacific Crossing—Japan—United States.
- * World's Most Enduring Endurance Record—34 hrs. 53 min.
- * World's Distance Record—3585—5211 miles New York—London.
- * Fastest Trans-Atlantic Crossing—Newfoundland—London, 9 hrs. 18 min.
- * First Men-Ship Passenger Carrying Flight—New York—Germany.

Five many more outstanding trans-oceanic and endurance flights.

BELLANCA AIRCRAFT CORPORATION

New Castle, Delaware, U.S.A.

CANAL BELLANCA



3500 TRANSPORT AND AMBULANCE
(See Page 4)



BELLANCA 175000 SERIES
(See Page 10)



105000 SERIES AIRPLANE
(See Page 26)

AVIATION
PUBLISHED 1938

128



Tab Controls BY BREEZE

The technique of handling modern aircraft is made simpler by the use of Breeze Tab Controls.

Light-weight Breeze Controls are engineered and manufactured to last longer than any airplane. Among the outstanding features of Breeze Controls are ball and thrust bearings, ground screw threads, self-aligning couplings, and complete absence

of backlash. Breeze Tab Controls cannot contribute to failure.

Ask us about tab control design and installation for your aircraft. Our engineering staff is trained to handle the small but important problems of aircraft design. Make certain of having the best by consulting Breeze for all aircraft products. The Breeze name is known wherever planes are flown.



AIRCRAFT PRODUCTS

Radio Section: Radioless, Radioless
Intercom, Two-Way, Three-Way
Weather Control and Storage
Jacobsen, Bess
Flexible Shaft and Drive Assembly
for Breeze Controls, Instruments,
Stamps, First Aid Kits, etc.

Aviation: Portable and All Types
Control To Radio
Automatic Radio Control
Radio Control Unit
Propeller Pitch Control
Control and Ignition Valve

Director and Radio Tab Controls
Electrically Operated, Electric Control
Automatic, etc.
Electrically Operated
Radio and All Types
Radio Control Unit
Electrically Operated Control

STAINLESS STEEL DIVISION

Performs the design and development of stainless steel structures and stainless steel fabricated products.

REGULAR CONTRACTORS TO THE U. S. GOVERNMENT

BREEZE CORPORATIONS, INC.

41 SOUTH SIXTH ST.

NEWARK, NEW JERSEY

AVIATION
PUBLISHED 1938

129



NEW INSTRUMENT PANEL

which accounted more for its improvement in short stops.



NEW ADJUSTABLE TAIL WHEEL

to smoothly take landing and greatly increase ground handling.



NEW VIBRATION SHIELD

made to absorb motor action caused by landing on all models.



NEW SEAT CONVEYOR

with electrically adjustable seat back and reclined position.



*A much finer Airplane
--at no increase in price*

FAIRCHILD '24 for 1939

The latest Fairchild '24' for 1939 has behind it a heritage and background of six years' concentration on a carefully worked design. Every component part has been through the mill of hundreds of thousands of hours of flight tests. Every detail of structural design has proven its reliability year after year . . . with never a single failure.

Each year we have made the '24' a better, finer airplane. In 1939 we have added more features which make it, by far, the greatest value we have ever offered. The new ship is even safer on the ground because hydraulic brakes and steerable tailwheel are standard equipment. It is more convenient because the nose, landing gear, fuel and oil sump are on the front end. Flaps are on the wing like those on a biplane. The redesigned instrument panel has more room for radio equipment. Three-point ventilation now looks into all models. Airbrakes are available when required. Many other details blend together to make the new '24' the most desirable light airplane ship for warm water or overseas flights. It is offered with either the Warner LS 35, 2, or Ranger 500 H. P. engines at no increase in price.

During 1938, hundreds of executives, engineers, commercial operators and government officials purchased new Fairchild '24's from all other 4 or 5 place ships in America. The 1939 model is an even more logical choice for the discerning buyer who wants a perfect balance between economy, performance, safety and extreme ease of handling. Complete details will be furnished and demonstrated at any of your representatives.

FAIRCHILD
AIRCRAFT CORPORATION

Long Beach

Maryland

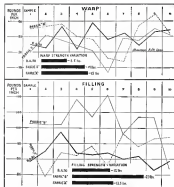


AVIATION
February, 1939

106

UNIFORM STRENGTH ?

STUDY THESE GRAPHS



Weight in Oz. per sq. yd. B-A*30-3.75, Fabric "A"-3.57, Fabric "B"-4.15

No wonder

B★A★30

IS KNOWN FOR ITS UNIFORMITY!

The variations nature produces in cotton fibers pose a problem for manufacturers of fine textiles. In our mills, the solution of this problem has developed the artisan's skill to a very high degree. The graphs above demonstrate that in B★A*30 we have produced a fabric showing unusual uniformity in tensile strength of both warp and filling. B★A*30 is not only more safely uniform in strength—it is also lighter and therefore, requires less "dope" in the preparation for actual service. Since year selection of fabrics must be governed by weak spots not strong ones, these graphs tell the story of B★A*30 uniformity better than a thousand words could do. Samples and prices of B★A*30 and other aeronautical fabrics can be obtained on request.

WELLINGTON SEARS COMPANY, 65 Worth Street, New York, N. Y.

AVIATION
February, 1939

107

ARE STANDARD EQUIPMENT ON
THESE FINE ENGINES!

These four fine engines, standard power equipment in the most popular smaller planes, are exceedingly well designed, well built and well equipped. Outstanding among their quality specifications is the Bendix-Sciatic SF4 Avcolet Magneto. No finer ignition could be provided... because none finer is built.

SCINTILLA MAGNETO DIVISION
BENDIX AVIATION CORPORATION
SIDNEY, NEW YORK

CONTINENTAL

FRANKLIN

LYCOMING

MENASCO



Water, Sweden, 1990

AN EPOCHAL
CONTRIBUTION
TO THE SAFETY
OF FLIGHT

THE LEARADIO ARC-6 AUTOMATIC RADIO DIRECTION FINDER

**Now for the First Time—a Positive Homing Device
for Use on All Transport, Commercial, Army,
Navy and Private Aircraft—**

→ a radio compass—direction finder—communication receiver, all in one compact light weight unit! The LEARAD90 ARC is a radio compass providing accurate direction finding on frequency bands: 130-585 KC, 300-1200 KC, 1250-2000 KC (both as an automatic direction finder and broadcast receiver), and on 2200-6300 KC as a communication receiver. With crystal locked reception, it provides quick, accurate tuning in line with latest airline practices.

The LEARNING AHC provides four types of direction findings: (1) aerial null, (2) visual null, by using the signal strength meter as an indicator, (3) left right indicator, (4) and also as an automatic robot loop and remote direction indicator. The latter is an exclusive feature with the LEARNING AHC.

The latest development in direction finders, this device when used for homing requires simply that the pilot tune in on a radio range or broadcast station. Immediately the indicator points, and stays pointed to the station tuned in. Although especially built for airline use, its low weight and price meet the requirements of the private pilot, charter and feeder airline operator.

LAND PLANE CAPACITY AND PERFORMANCE
IN AN **All-Purpose Amphibion**

That's the **FUZZYWINGS SEA BIRD**. (Just tap the data below against that of any local plane of the same power and see for yourself.) And the **SEA BIRD** handles like the best local plane.

It gives you the extra safety, comfort, quiet and visibility possible only in amphibians. The structure is stainless steel and the hull is covered with the same tough, resilient metal.

For pleasure flying or for work-hauler operations under extreme conditions the SEA WIND has proved its superiority from the British Colonies and gold fields to the steaming tropics. Landings and take-offs from either land or water flexible and dependable.

Learning and Development
Economic
And sustainable improvement in work

PERFORMANCE WITH FULL LOAD
 Shipped load 3000 pounds, including four passengers, loaded personal baggage. Survey vehicle and capacity within of fuel.

1-Engine Speed	1-Engine Speed
135 mph	135 mph
135 mph	135 mph

Crabbing Speed	125 mph	125 mph
Rate of Climb	914 ft. per min.	975 ft. per min.
Range*	525/400 miles	514/400 miles
*Range starts at 300 mph		
*At 12% hp/ft and maximum speed		

What's for Dinner?
(Reprinted
from *Good and Beautiful*)



~~→ FLEETWINGS →~~

INCORPORATED
WESTON, PENNSYLVANIA
General Agent: 14100 ARDENWORTH, S.W.
DALLAS, TEXAS 75244, New York, N.Y.



Emergency Contact: 311

¹⁷ *Nature* 412 (2001) 450–451.

Engineering, Installation and Service on All Types of Aircraft Radio
 Getting Especially in Pacific Line
 Operators

LEAR DEVELOPMENTS

INCORPORATED
ROOSEVELT FIELD,
HUNGLA, LONG ISLAND, N. Y.

Export Dept.
17 State Street New York, N. Y.
Cable Address: LEARNCOF

A NEW LUNKENHEIMER STRAINER for Horizontal, Vertical or in-between mounting

AIR CORPS
TYPE C-3
DESIGN

Lunkenheimer
Fig. No. 1749
½ and ¾ inch



A SMALL PART

*in an industry
where small parts are important!*



When the first airplane flight was made at Kitty Hawk in the year 1903, Packard Electric had been making spark plug wires for two years, and had already introduced important developments in high-tension cable.

Now the aviation industry has come into its own in the scheme of modern transportation. It is an industry where small parts are important, and Packard is proud to have

served it, as well as having served the automotive industry... by improving Packard cable through continuous research and experiment. Better performance has been the result, and Packard spark plug cable — both tapered and the new "440" — is used by leading airlines, as well as by Government and private fleets. Packard Electric Division, General Motors Corporation, Warren, Ohio.

Packard
ELECTRIC

AVIATION
February, 1933
148

SIMPLIFY BY SPECIFYING:

"Parts by Brewster!"



LET Brewster worry about the smaller, yet all-important features of your finished product! We are fully equipped for the job.

Our plant, seen above, has been greatly enlarged to insure the utmost in speedy service and prompt deliveries.

Brewster's up-to-the-minute engineering facilities and long experience in designing and manufacturing airplane parts have won for us world-wide confidence.

Entire Brewster's intelligent cooperation. Let us supply your major metal parts — wing and tail surfaces, floats, fuel tanks, cowling, etc.

BREWSTER AIRCRAFT PARTS

DIVISION OF

BREWSTER AERONAUTICAL CORPORATION, LONG ISLAND CITY, NEW YORK

AVIATION
February, 1933
149 A

TWO NEW INDISPENSABLE AVIATION BOOKS!

AIRPLANE SERVICING MANUAL

BY LT. COL. V. W. PAGE
1,800 Pages Price \$6.00



Here is complete guidance in every phase of servicing—a volume every flyer in scope, yet concise in the work of presentation. For students, pilots, mechanics, commercial operators and field service men. The entire aviation maintenance field is covered with painstaking thoroughness. There are 25 mechanical chapters, fully illustrated with photographs, drawings and factory blue prints. Treats on operations, trouble shooting, repainting, rigging, aircraft rules and other service problems. NO ONE INTERESTED IN PRACTICAL AVIATION CAN AFFORD TO BE WITHOUT THIS BOOK.

METAL AIRPLANE STRUCTURES

BY MAJOR F. E. LOYD
500 Pages Price \$5.00

An authoritative guide, written by an expert, dealing with practically every type of metal construction as now in present day airplanes. The author analyzes and describes in detail, the various types of planes, their designs and illustrating principles of design, methods of construction. Shows extensive treatment in practical practice, an opportunity to learn thoroughly about the subject. Contains a discussion of theory but the volume with a wealth of facts for the practical man in the shop.

Have You These Other Important Books? AVIATION ENGINE EXAMINER

By Col. V. W. Page. A systematic course of lessons in aviation still current. Prepared especially for the day and field mechanic and the student pilot. 400 Pages, 24 Illustrations, Price \$3.00.

AERIAL NAVIGATION AND METEOROLOGY

By L. A. Yawer. Filled with practical information on flying a plane successfully under all conditions. 358 Pages, 135 Illustrations, Price \$4.00.

RENNY'S ABC OF GLIDING AND SAILFLYING

By Col. V. W. Page. A complete course on finding your way about and sailplanes and their construction, control and handling. 204 Pages, Price \$3.50.

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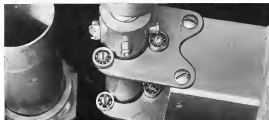
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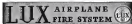
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